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AI and the Future of Organic Farming: Student Worksheet

Part 1: Understanding Organic Products and Their Benefits (Objective O1)

Activity 1: Define and Describe

1. **Define:** In your own words, what makes a product "organic" (specifically food products, but you can also consider textiles)?

Your Definition:

2. **Contrast:** How does an organic farm differ from a conventional (non-organic) farm in terms of inputs and practices? Complete the table below:

Feature	Organic Farm	Conventional Farm
Pesticides		
Fertilizers		
Genetic Modification (GMOs)		
Livestock Care		

Activity 2: Environmental Impact

Organic farming practices are known for their environmental benefits. Explain *how* each of the following practices leads to a positive environmental outcome.

- **Practice:** Avoiding synthetic pesticides and herbicides.
 - **Environmental Benefit:**
- **Practice:** Using natural, non-synthetic fertilizers (like compost or manure).
 - **Environmental Benefit:**



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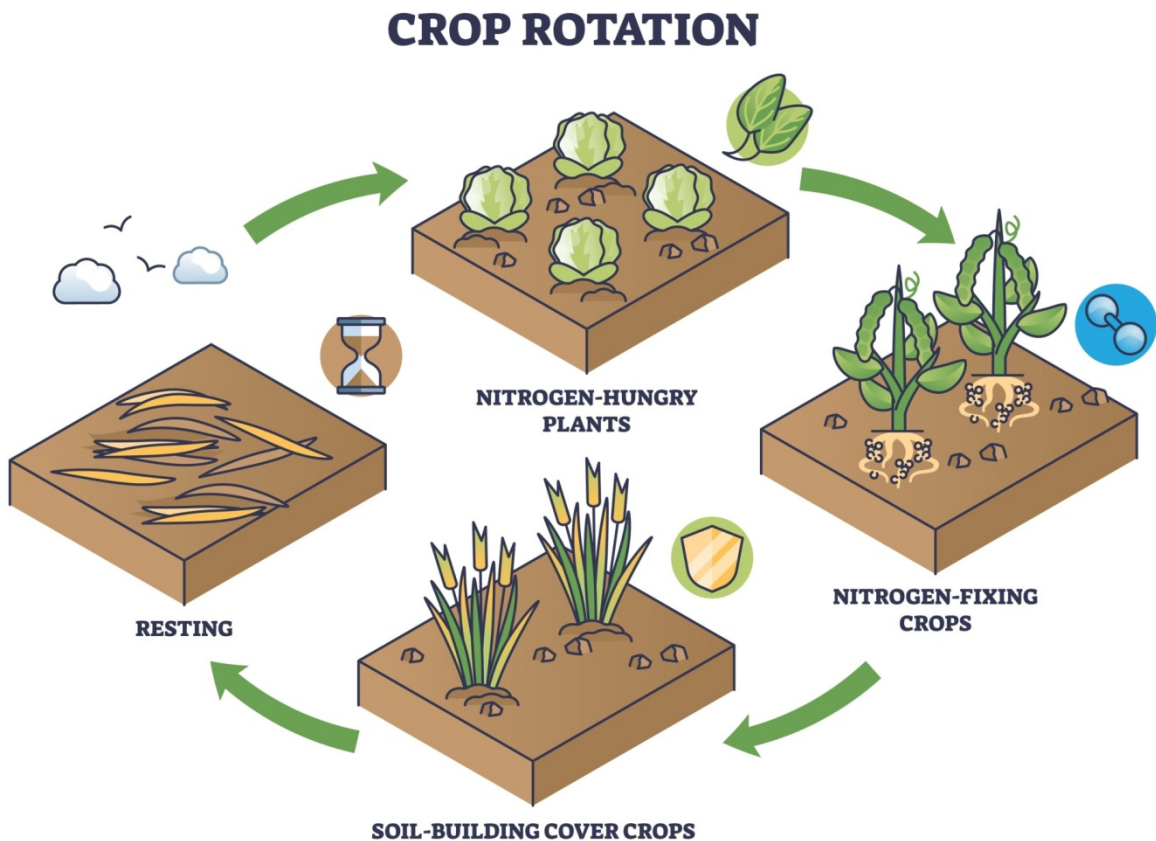
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- **Practice:** Encouraging biodiversity (e.g., planting different crops, having hedges).
 - **Environmental Benefit:**
- **Practice:** Using techniques like crop rotation.

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* **Environmental Benefit:** *



Part 2: AI's Role in Sustainable and Organic Agriculture (Objective O2)

Activity 3: Introduction to AI in Farming

Artificial Intelligence is being used to make farming more efficient and sustainable. Read the descriptions below and match the AI technology to its function.



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AI Technology	Function
A. Computer Vision (Image Recognition)	1. Using complex algorithms to analyze large datasets (weather, soil, market prices) to give farmers advice on planting and harvesting.
B. Predictive Analytics/Machine Learning	2. Using cameras on drones or tractors to identify individual weeds, crop diseases, or pest infestations with high accuracy.
C. Robotics/Automation	3. Using automated machines to perform repetitive tasks like harvesting, soil testing, or precise application of water/fertilizer.

- AI Technology that helps a farmer decide the best time to plant based on climate models: ()
- AI Technology that can distinguish a weed from a crop seedling: ()
- AI Technology that could harvest a delicate organic strawberry crop: ()

Activity 4: Supporting Organic Principles with AI

Explain how the use of AI can specifically support the principles of *organic* agriculture, making it more effective and competitive.

1. **Weed Control:** Organic farms cannot use chemical herbicides. How can an AI-driven system help an organic farmer manage weeds more effectively than manual labour?

Explanation:

2. **Water & Nutrient Management:** Organic farming focuses on soil health. How can AI (e.g., using sensors and data) ensure that water and natural fertilizers are only used where absolutely necessary?

Explanation:

3. **Disease Monitoring:** Quick identification is key to stopping the spread of disease without using broad-spectrum chemical treatments. How can AI-powered cameras or drones help?



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Explanation:

Part 3: Designing AI Solutions for Organic Production (Objective O3)

Activity 5: Brainstorming AI Solutions

Imagine you are a team of agricultural technology developers. Design two simple ideas for using AI to solve specific problems faced by an organic farmer.

Idea 1: The AI-Powered "Pest Patrol"

- **Problem:** An organic orchard is at risk of a specific insect pest (e.g., codling moth). The farmer cannot spray wide-area pesticides.
- **Your AI Solution:** What technology would you use (e.g., Computer Vision, Robotics, Predictive Analytics) and how would it work to control the pest organically?

Technology Used:

How it Works (Step-by-Step):

Idea 2: The AI "Soil Health Advisor"

- **Problem:** The farmer needs to maintain peak soil fertility without using synthetic nutrients. They need to know the optimal time and place to apply compost and plant cover crops.
- **Your AI Solution:** What technology would you use and how would it work to give the farmer personalized, sustainable advice for improving their soil health?



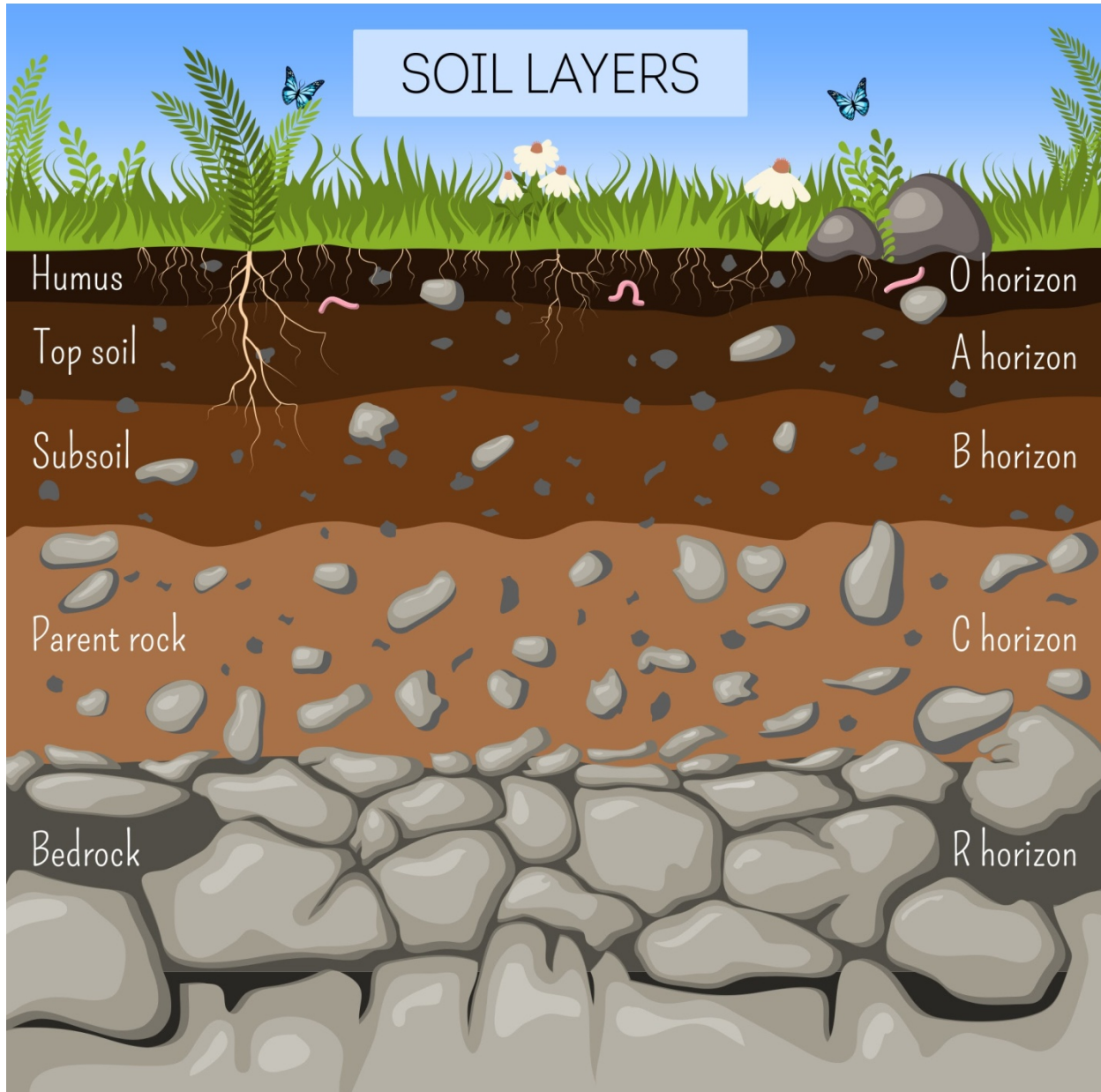
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> **Technology Used:**

> **How it Works (Step-by-Step):**



Extension/Review Question

AI is often associated with high costs and complex technology. Do you think the benefits of using AI in organic farming (like higher yields, less waste, and



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competitiveness) outweigh the initial investment costs? Justify your opinion in a short paragraph.

Your Opinion:



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