



Virtual Greenhouse Design Challenge

STEM4inclusive schools
WP2 – Toolbox



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Structure of the activity

A Introduction

about the topic

What is a virtual greenhouse?
Why is sustainable agriculture important?
What are the goals of this activity?

B Training phase

about the training

Research and design a virtual greenhouse.
Explore sustainable agricultural practices.
Showcase your findings and discuss their impact.

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A: About the topic

What is a virtual greenhouse?
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What is a Virtual Greenhouse?

- A controlled environment for growing plants efficiently.
- A digital model to simulate sustainable agricultural practices.
- A platform for learning about innovation and resource optimization.





Why greenhouses are important?

- **For the environment:** Minimize waste and use resources efficiently. Support biodiversity through controlled ecosystems.
- **For society:** Ensure food security with year-round production. Educate communities about sustainable practices.
- **For the economy:** Promote profitable and efficient farming techniques.





Key Features of a Sustainable Greenhouse

1. **Plant Placement:** Maximize sunlight exposure.
2. **Water Conservation:** Use drip irrigation or rainwater collection.
3. **Renewable Energy:** Integrate solar panels or wind turbines.
4. **Efficient Space Use:** Explore vertical farming or modular layouts.





Why Sustainable Agriculture Matters?

- Protect the planet's limited resources.
- Improve food security and access.
- Enhance quality of life through innovative farming

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What greenhouse features do you plan to implement in your design?



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Benefits of Greenhouses

1. Provide controlled environments for plants in various climates.
2. Support year-round food production.
3. Reduce environmental impact compared to traditional farming.





Let's have a look at this
YouTube video!

How does a greenhouse work?



https://www.youtube.com/watch?v=JtTDx8_dlsE

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Design Goals

1. Optimize plant growth with sunlight and space.
2. Conserve water with efficient systems.
3. Utilize renewable energy for sustainability.
4. Create modular structures for scalability.



Renewable Energy in Greenhouses

- Solar panels for clean energy.
- Wind turbines for supplementary power.
- Energy-efficient LED grow lights.

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Water Conservation Techniques

1. Rainwater harvesting systems.
2. Drip irrigation for targeted hydration.
3. Automated sensors to monitor soil moisture.

Space Efficiency Solutions

4. Vertical farming to maximize small spaces.
5. Modular layouts for flexibility.
6. Multi-layered planting for diverse crops



Challenges in Greenhouse Design

- Balancing innovation and functionality.
- Ensuring energy efficiency in different climates.
- Addressing resource limitations.



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How Greenhouses Support Biodiversity

- Provide habitats for diverse plants.
- Create controlled microclimates for sensitive species.

**Greenhouses are essential for sustainable agriculture.
Technology enhances efficiency and innovation.**

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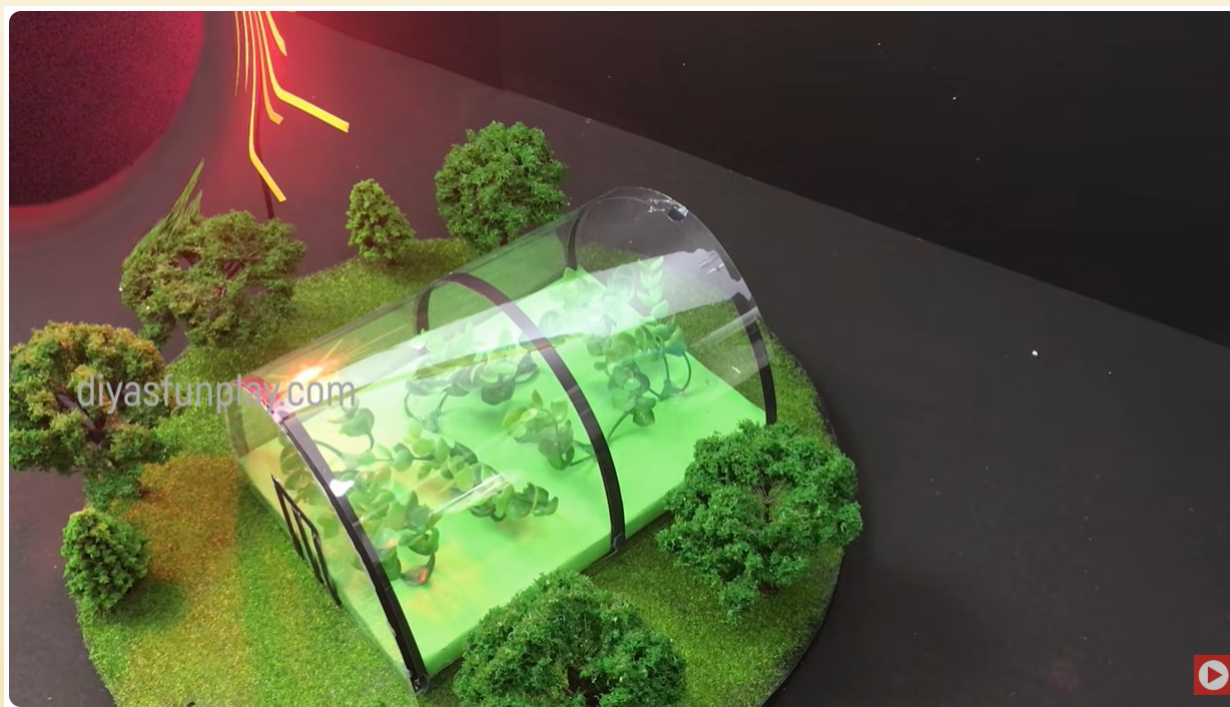
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DIY!

You can also make a greenhouse model



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<https://www.youtube.com/watch?v=iVjtM33iYYw>

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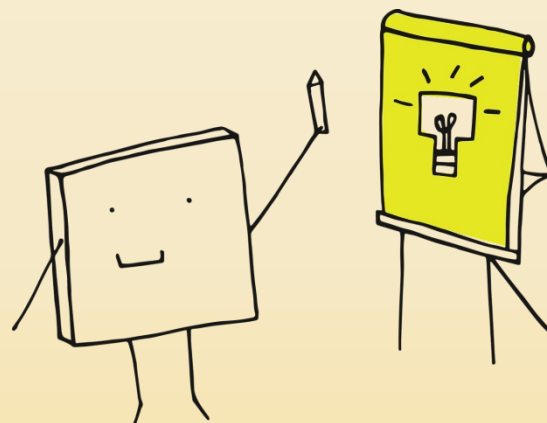
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B: Virtual Greenhouse Design Challenge



Training phase

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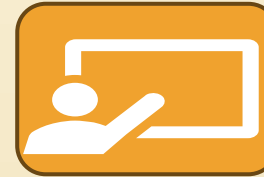


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Your task:

- Design a digital model of a greenhouse.
- You have 6 days.
- Work in groups and show the results to the others.



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DAY 1

Discuss in your group:

1. What are the key features of a sustainable greenhouse?
2. How can water and energy be conserved in a greenhouse?
3. What role does space efficiency play?

Write down at least 5 ideas for your greenhouse design in Table 1.

DAY 2-3

Explore free online tools (e.g., Google SketchUp or Tinkercad) to familiarize yourself with their features. Begin creating a virtual greenhouse model with your group. Ensure your design includes:

1. Efficient plant placement.
2. Water conservation systems.
3. Renewable energy integration.
4. Space optimization.





DAY 4-5

Refine your virtual greenhouse design based on group feedback. Create a digital presentation or infographic showcasing:

1. Key features and innovations.
2. Environmental benefits.
3. The impact of your design on sustainable agriculture.

DAY 6

Present your virtual greenhouse to the class.

Participate in a discussion about:

1. The creativity and feasibility of each design.
2. How each design supports sustainability.
3. Reflect on what you learned about sustainable agriculture and the use of technology.

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H5P- Tasks:

I had a problem with preparing H5P... Could you please help me? I prepared the content...



Drag the Words – Components of a Greenhouse

Match the following terms to their descriptions:

1. Drip irrigation – Conserves water by delivering it directly to plant roots.
2. Solar panels – Generate renewable energy to power greenhouse systems.
3. Ventilation system – Maintains optimal temperature and airflow within the greenhouse.

Memory Game – Sustainable Features

Match sustainable greenhouse features to their benefits:

4. Efficient plant layout – Maximizes sunlight exposure.
5. Rainwater collection – Reduces dependency on external water sources.
6. LED grow lights – Saves energy while promoting plant growth.



H5P- Tasks:

I had a problem with preparing H5P... Could you please help me? I prepared the content...



Multiple Choice Quiz – Sustainable Agriculture Practices

1. Which of the following is a sustainable water conservation method?
 - a) Flood irrigation
 - b) Drip irrigation**
 - c) Sprinkler irrigation
2. What is the primary benefit of using renewable energy in greenhouses?
 - a) Lower upfront costs
 - b) Reduces greenhouse gas emissions**
 - c) Requires less maintenance

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Congratulation!

You mastered the activity on Virtual Greenhouse Design Challenge!

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