Green Industries

THJ20

Designing a Greenhouse

This Project Overview

Students will create a teacher-approved scale model greenhouse using the design process. They'll design and build a plant propagation device suitable for home use, providing easy access. This activity includes lessons on greenhouse history, purpose, design, and operational factors, catering to those interested in organic plant propagation or establishing home food sources during pandemics.

This Project Outline includes the following components

Introduction – What is a greenhouse and what role do they play in society?

Activity # 1: Early history of greenhouses

Activity # 2: Factors contributing to successful plant growth

Activity # 3: Study of greenhouse materials and styles

Activity # 4: Greenhouse research and design

Activity # 5: Greenhouse construction

Introduction

Review the article on Greenhouse

What is a greenhouse and what role do they play in society?

Allows us to produce plants in a controlled environment. To produce plants out of season

[What is a greenhouse https://www.britannica.com/topic/greenhouse](https://www.britannica.com/topic/greenhouse)

Activity 1 Early History of Greenhouses

Review the article on the history of Greenhouses

Early History of a Greenhouse

Existed in Roman times to have food year-round. The concept of the greenhouse involved in Europe in the 17th century in the Netherlands, Italy, and England. One of the problems was balancing the heat. Made mostly of glass back then. Structures have varied in design and materials over the years. Polyethylene is a popular choice today as well.

Activity 2 Factors contributing to successful plant growth

Factors contributing to successful plant growth

- ❑ Adequate light
- ❑ Favorable air control
- ❑ Protection from insects, animals, and diseases
- ❑ Suitable growing media including moisture and essential elements

Favorable enclosure temperatures – Remember, when radiant light enters the greenhouse it becomes trapped inside, therefore creating a heat source.

Computerized greenhouses allow us to control:

- ❑ Light Intensity
- ❑ Temperature
- ❑ Humidity
- ❑ Fans
- ❑ Shading
- ❑ Venting
- ❑ CO2
- ❑ Water Consumption

Activity 3 Study of greenhouse materials and styles

Gutter - connected

Stand-alone or detached

Quonset or Hoop-house

Activity 3 Study of greenhouse materials and styles

2 popular (actual) coverings are:

Glass

- Expensive
- Last longer
- Allows more light to pass through
- Retains less heat
- Requires constant cleaning
- More condensation

Polyethylene

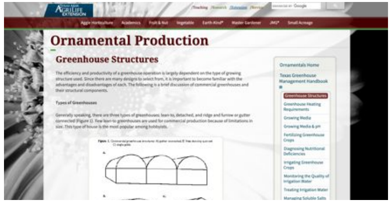
- Usually two-ply with air in between to act as an insulator
- Allows less light to pass through
- Darkens with age (ultraviolet rays affect it)
- Lasts about 10 years if properly maintained
- Less expensive. Retains more heat

Other Materials

- Brick
- Wood
- Galvanized steel
- Aluminum

Activity 4   Greenhouse research and design

Review the resources



[Ornamental Production Greenhouse Structures](https://aggie-horticulture.tamu.edu/ornamental/greenhouse-management/greenhouse-structures/)
https://aggie-horticulture.tamu.edu/ornamental/greenhouse-management/greenhouse-structures/

Activity 5 Greenhouse Research & Design

Students will be given time to research and design their model. Time may also be spent outside the classroom to finish the activity. Students are asked to seek the help of the teacher where needed.

Source	Design type	Likes	Dislikes	Comments

Introduction – What is a greenhouse and what role do they play in society?

Greenhouse Wikipedia Article
https://en.wikipedia.org/wiki/Greenhouse

4 Plant Growth Factors That Affect All Plants
https://garden.lovetoknow.com/garden-basics/plant-growth-factors

A - Building a Mini Greenhouse

Challenge: Your assignment is to design and construct a mini greenhouse, capable of housing one seed tray measuring 9 inches wide, 20 inches long and 3 inches high. Your model should allow for easy placement and replacement of the tray. The model should be for the propagation of plants from seed. Please allow a sufficient height so that your model can allow for small plants under one foot. You must have a way to access the inside of your greenhouse to maintain your plant material. You will have access to polyethylene, wood, and other building materials. You will also research this project to obtain some ideas. Remember to keep a list of all the resources you used for this project.

B - Brainstorming - Questions & Research

1. What materials should I use?
2. What materials do I have access to?
3. What style of greenhouse should I construct? Have 2 or possibly 3 sketches.
4. Should I build it with a waterproof bottom in case of water leakage?
5. Should I make it portable?
6. How big should I make it?
7. How will I design my greenhouse so that I will be able to water plants in the future?
8. What kind of plant propagation will I be doing?
9. What tools do I have access to?
10. Do I have a ‘Plan B’ in place?
11. Do I have access to other alternative coverings such as plexiglass or clear acrylic?

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C - Design Process Checklist

- ❑ Do you have the proper writing utensils and paper?
- ❑ Are you competent with a measuring tape or ruler?
- ❑ You will need to make 2 or possibly 3 rough sketches showing top, front, and side views.
- ❑ Did you make a list of possible materials?
- ❑ Gather your materials. See what is available to you and if you will have to acquire additional materials.
- ❑ Check to make sure the proper tools are available.
- ❑ Make sure you read over any safety material and always ask if you are unsure about something.
- ❑ Make a list of all your materials/fasteners and give the purpose of each one.
- ❑ Prepare in writing, a 250-word document outlining your ideas/rationale.

Create Design Drawings

Use a pencil and paper with a ruler to create 3 rough sketches of your mini greenhouse

Sketch #1	Sketch #2	Sketch #3

Material List

Develop a materials list you will need to build your mini greenhouse

Materials	Description	Quantity

Reflection Notes

Questions	Answers
Explain what you liked and disliked about this project. Why?	
Did you learn something new? What stands out?	
If you had to revise one or two things on your final project, what would they be?	
Please provide any feedback you may have for improving this lesson.	

Safety Resources

[OCTE Green Industries Safety Guidelines] - Link

PPE Required:
Safety Glasses
Gloves where applicable

Rubrics, career connections and more information

In depth resources for Designing a Greenhouse can be found at:

https://drive.google.com/file/d/15grNILg5MtldHfbjNMhv5VipiAAIMma_/view?usp=sharing

https://octe.ca/resources/secondary/thj2o-green-industries-designing-greenhouse