ENGINEER A GREENHOUSE

Design and construct a model greenhouse for using simple craft materials.
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About the Activity

Greenhouses are protected structures that allow botanists to grow plants in a controlled climate. Transparent materials (like glass or sturdy plastic) shield plants from a harsh environment while still giving them natural sunlight. Gardeners benefit from greenhouses where they can control warmth and moisture to help plants thrive.

This activity will use the engineering design process to design and build a model greenhouse for one or more pretend plants.

This activity is part of our 4-H At-Home Plant Science Series. See the rest of the activities here.

Supplies

These simple supplies are all you’ll need for this activity.

- Pencil
- Printable paper plant templates
- Printer
- Scissors
- Popsicle sticks
- Chenille sticks
- Masking tape
- Plastic wrap
- Tissue paper
- Rubber bands
- Paper clips
- Poster putty
- Hot glue gun (with adult supervision)

Grades: 6-8

Topic: Agriculture, Engineering, Plant Science, STEM

Time: 45-60 minutes
Activity Steps

Engineers design and construct buildings, machines, vehicles, and tools to solve real-world problems. Greenhouses are designed so that botanists can easily grow plants year-round.

Follow this engineering design process that engineers use to find solutions to their problems, and learn how to make your own greenhouse:

1. Print out the Greenhouse Plants document, then choose a paper plant template to represent a plant that you want to “grow” in your greenhouse.

2. Cut the shapes out along the dotted lines, and inside the two pieces of dirt so the pieces will fit together.

3. Insert the bottom slit of the plant cutout into the top slit of the dirt cutout, forming an X shape.

DID YOU KNOW? Since Roman times, botanists have used greenhouses to grow plants. Greenhouses are particularly helpful for growing non-native plant species in locations where they don’t naturally exist. For example, citrus trees need warm places to grow, but botanists in colder regions can grow these trees indoors in a greenhouse because they can control the temperature and keep the plants warm. The first modern greenhouse was built in the 1800s in Holland.

4. Next, ask yourself the question: What problem are you trying to solve? You are trying to build a greenhouse model large enough for your paper plants to grow for this activity. It’s time to brainstorm a solution, so look at your materials and see how you could use them. The greenhouse model must be a stable, free-standing structure that allows the plant space to grow, and it must be made of transparent materials to allow light to enter the greenhouse.

5. Use your blank paper to sketch out your design, keeping in mind that you’re about to build your design with the supplies you have.

6. Now, get building! Using your supplies, build your greenhouse based on the design you sketched out. If you are using a glue gun, be sure to ask an adult for help.

7. NTest your greenhouse! Insert your 3-D plants into the greenhouse. Does it meet the criteria listed in step 4? If not, rework it until it can!

DID YOU KNOW? In real life, a well-designed greenhouse will have these elements

Ventilation: to regulate temperature and humidity

Heating elements: to increase the temperature, if needed

Cooling system: to decrease the temperature, if needed

Lighting: to provide lighting when natural (sunlight) is not present

Watering system: to provide water and other nutrients to plants

4-H at Home | Engineer a Greenhouse
Test Your Knowledge

See how much you've learned!

QUESTION 1
True or False: A greenhouse is a structure with walls and a roof, primarily made of transparent materials where plants grow.
   a. True
   b. False

QUESTION 2
What country constructed the first modern greenhouse?
   a. England
   b. France
   c. Holland
   d. Spain

QUESTION 3
Which of the following is not a common shape of a greenhouse?
   a. A-frame
   b. Gable
   c. House
   d. Tunnel

QUESTION 4
Greenhouses need ventilation to regulate:
   a. Fertilizer
   b. Lighting
   c. Temperature & Humidity
   d. Water

QUESTION 5
What is an example of a plant that needs a warm, tropical climate to grow?
   a. Blueberries
   b. Corn
   c. Oranges
   d. Potatoes

Reflection Questions
Bonus questions to inspire wonder:

• How did you use the engineering design process to construct your greenhouse?
• Did you have to make any improvements to your greenhouse? If so, what were they?
• Have you seen a greenhouse in real life? How did it compare to the greenhouse you built?
Investigate & Explore
Take your new knowledge to the next level.

Originating during the Italian Renaissance, many wealthy homeowners began to install orangeries attached to their houses. These greenhouse-like structures were called orangeries because they grew tropical plants, like oranges, and protected them from cold weather. As pineapples became popular to eat in Europe, pineries or pineapple pits were built as well. Over time, larger greenhouse structures were built throughout Europe, Asia, and the United States.

Today, universities, laboratories, garden centers, museums, public gardens, and even homeowners may use greenhouses to help cultivate their plants. When different plants are being selectively bred for desirable characteristics, this is done inside a greenhouse to try to control for as many variables as possible.

Brought to you by:

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