

Barbie™

Storybook and
Experiment Manual

PLANT SCIENCE KIT



SCIENCE AT THE FARM

WARNING.

- »» Not suitable for children under 4 years.
- »» For use under adult supervision.
- »» Read the instructions before use, follow them and keep them for reference.

WARNING — This set contains chemicals that may be harmful if misused. Read cautions on individual containers and in manual carefully. Not to be used by children except under adult supervision.



Safety Information



WARNING: CHOKING HAZARD — Small parts. Not for children under 3 yrs.

WARNINGS.

Not suitable for children under 3 years.
Choking hazard — small parts may be swallowed or inhaled.
Keep the packaging and instructions as they contain important information.
Do not eat the seeds, plants, seed bombs, or garden stones.

Handling Precautions for Plaster/Gypsum

Advice for Supervising Adults

- » This chemical toy is not suitable for children under 4 years. For use under adult supervision. Keep this chemical toy set out of reach of children under 4 years old.
- » Read and follow these instructions, the safety rules, and the first aid information and keep them for reference.
- » Incorrect use of chemicals (the plaster, particularly swallowing or inhaling it) can cause injury and damage to health. Only carry out those activities which are listed in the instructions.
- » Because children's abilities vary so much, even within age groups, supervising adults should exercise discretion as to which activities are suitable and safe for them. The instructions should enable supervisors to assess any activity to establish its suitability for a particular child.
- » The supervising adult should discuss the warnings, safety information and the possible hazards with the child or children before commencing the activities.
- » The area surrounding the activity should be kept clear of any obstructions and away from the storage of food. It should be well lit and ventilated and close to a water supply. A solid table with a heat resistant top should be provided. When working with plaster, wear suitable clothes that can get dirty.
- » The working area should be cleaned immediately after carrying out the activity.
- » Disposal: Spilled or leftover plaster should be placed in the household trash.

Safety Rules for Handling Plaster

- » Keep younger children under the specified age limit and animals away from the activity area.
- » Store chemical toys out of reach of young children.
- » Wash hands after carrying out activities.
- » Clean all equipment after use.
- » Do not use any equipment which has not been supplied with the set or recommended in the instructions for use.
- » Do not eat, drink or smoke in the activity area.
- » Do not place the material in the mouth.
- » Do not inhale dust or powder.
- » Do not apply to the body.
- » Work slowly in order to avoid stirring up plaster dust into the air.

First Aid Information

- » In case of eye contact: Wash out eye with plenty of water, holding eye open. Seek immediate medical advice.
- » If swallowed: Wash out mouth with water, drink some fresh water. Do not induce vomiting. Seek immediate medical advice.
- » In case of doubt seek medical advice without delay: Take the chemical and/or product together with the container with you.
- » In case of injury always seek medical advice.

Declaration for the soil pellets according to the Fertilizer Ordinance: The growing medium (soil pellet) is made of plant materials from agriculture (coconut material). Contains organic matter.

Salinity (KCl/l): 0.3g/liter;

pH value (CaCl₂): 5.0.

Raw materials: 100% plant materials from agriculture (coconut material).

Minor components:

Nitrogen (N): 4mg/l (CAL);

Phosphate (P₂O₅): 20mg/l (CAL); Potassium (K₂O): 530mg/l (CAL); Magnesium (Mg): 80mg/l (CAL).

Contains the trace elements boron, copper, and zinc in agronomic relevant quantities. Use only in out-of-ground, container cultivation. The declared nutrient content pertains to the time of publication and are subject to natural fluctuations.
Weight: 36g (4 x 9g)



After finishing the seed bombs, Jane told the girls that it was time for her to bring some flowers and vegetables to the farm's stand at the local farmer's market.

The girls decided to package up the seed bombs and give them away to customers at the farmer's market. They put the seed bombs in little bags and tied the bags closed with ribbons.

At the farmer's market, people were very thankful for the seed bombs. After giving them away, Barbie and Nikki explored the farmer's market and saw all sorts of plants that they had also seen growing on Jane's farm. They saw plump red tomatoes, orange peppers, and purple eggplants. They saw pink cosmos, blue cornflowers, and white daisies. The market was alive with plants of all sizes, shapes, and colors.

Barbie and Nikki thanked Jane for all the science experiments, lessons in plant biology, and fun projects they did together at the farm. Jane told them they were welcome back anytime. The girls left, each with a few seed bombs in their pockets to place around the neighborhood.

THE END

A Word to Parents and Supervising Adults

Dear Parents,

This plant biology kit offers kids ages four and up a playful way to grow their first plants and learn about botany! They can start their experiments quickly with the fast-growing cress and pea seeds included.

Some experiments will require a little more time. Please explain to your child that it takes days, and sometimes weeks, to see signs of plant growth.

Help your child find a well-lit and well-ventilated location for the greenhouse. You could set up the greenhouse on a table near a window or on a wide window ledge.

Your child will also need a workplace that can stand getting a little messy. Cover your workplace with old newspapers. It's a good idea to keep towels on hand during the experiments, since gardeners are always spilling a little dirt or water.

And just as with real experimental research and gardening, it is always a good idea to wear old clothes that you don't mind getting a little dirty. After experimenting, wash your hands and the tools thoroughly.

Please be ready to support your little scientist whenever your help might be needed. Completely review the step-by-step instructions together. Please be sure to help your child get the additionally required materials that are not included in the kit.

It's always best to get everything ready before each experiment: The list at the beginning of each experiment shows you what materials are needed for the experiment.

Here's wishing you a lot of fun and a green thumb!



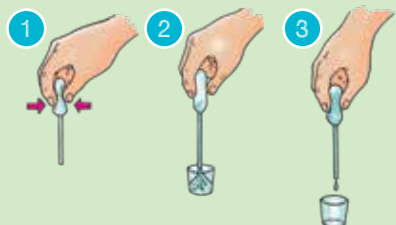
Each experiment that will take longer than one day is labeled with the approximate **time** it will require. This way, you will know how much time to plan or how long it will take to see any results.

Even though working with **plaster** is not particularly dangerous, you should always assist your child when working with plaster. Please read the safety instructions on the inside front cover carefully and explain them to your child.

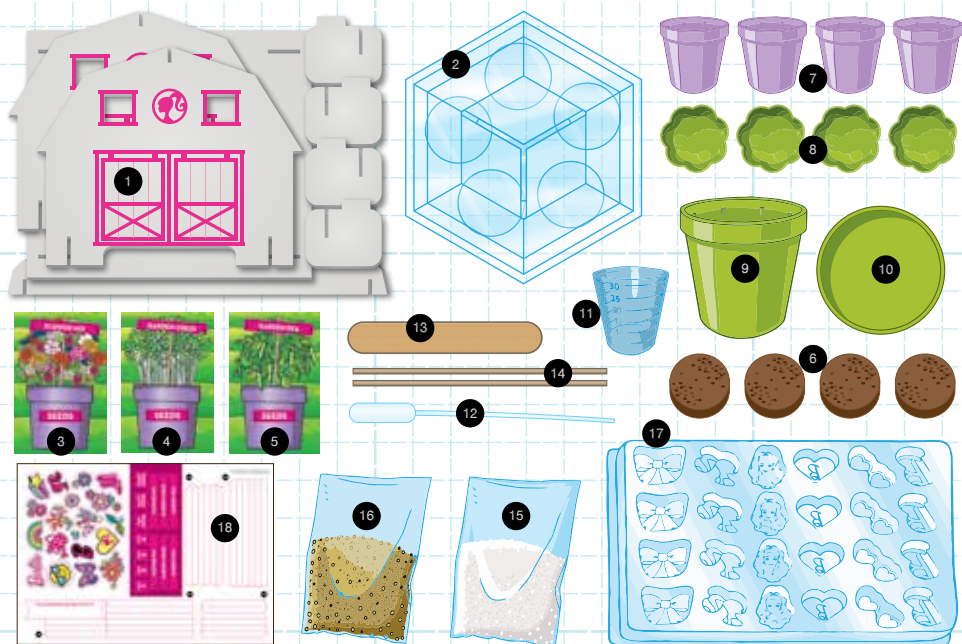
The plaster work should not be done in the kitchen to avoid being close to food. Containers and utensils that have come into contact with plaster should not be used in the kitchen.

How to use a pipette:

1. Squeeze the top part of the pipette between your thumb and forefinger and dip the pipette in the water.
2. As soon as you loosen the pressure, the liquid will rise up the pipette.
3. Then, by reapplying pressure carefully, you can squeeze the water out drop by drop.



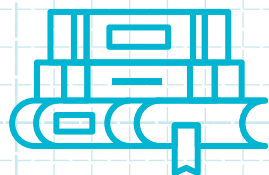
Kit Contents



✓ No.	Description	Quantity	Item No.
○ 1	Cardboard plant holder pieces	1	720 534
○ 2	Plastic greenhouse (2 pieces)	1	705 803
○ 3	Packet of flower seeds	1	702 869
○ 4	Packet of cress seeds	1	720 870
○ 5	Packet of pea seeds	1	720 871
○ 6	Soil pellet	4	708 735
○ 7	Small planting pot	4	720 872
○ 8	Small planting pot dish	4	720 875
○ 9	Large planting pot	1	720 873
○ 10	Large planting pot dish	1	720 874
○ 11	Measuring cup, 30 ml	1	065 100
○ 12	Pipette	1	708 761
○ 13	Wooden spatula	1	000 239
○ 14	Wooden stick	2	713 654
○ 15	Bag of plaster, 200 g / 7.0 oz	1	771 052
○ 16	Bag of sand, 200 g / 7.0 oz	1	373 130
○ 17	Plastic molding tray	1	719 191
○ 18	Sticker sheet	1	720 876

For some experiments, you will also need:
plastic cups, water, scissors, paper towels, sunny windowsill, table salt, dish soap, spoon, tape, sheet of white paper, newspaper, extra potting soil, plastic bowl

Composition of the Flower Seed Packet:
 25% *Centaurea Cyanus* (Cornflower/Bachelor's button); 20% *Linum Grandiflorum* (Scarlet flax); 20% *Calendula Officinalis* 'Pacific Beauty mixed' (Marigold); 15% *Cosmos Bipinnatus* 'Sensation mixed' (Garden cosmos); 10% *Leucanthemum Ircutianum* (Aster/Daisy); 10% *Lavatera Trimestris* (Annual mallow)



THE STORY BEGINS . . .

“Over here!” shouted Jane, waving to Barbie and Nikki from one of the plots in her vegetable farm. It was late summer, and row after row of plants were exploding in a display of colorful leaves, flowers, fruits, and vegetables. The girls carefully walked down a row of tomato plants to get to Jane.

“What a beautiful farm,” said Barbie. “There are so many different types of plants growing here. Can you show us around? We want to learn all about plants and botany!”

“Of course! There is so much to see and learn here. We grow vegetables and flowers on this farm. Then, we harvest them for local farmer’s markets and restaurants,” explained Jane. “Come on, you can help me out with a few projects.”





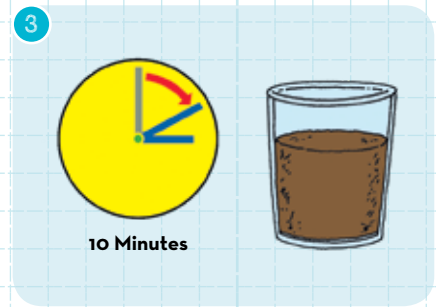
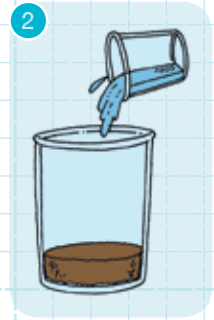
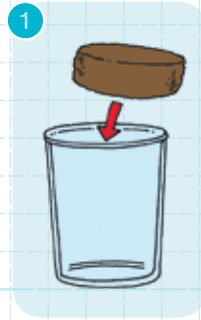
EXPERIMENT

Soil Absorbs Water

In this experiment, you will learn about the soil pellets and get them ready for planting.

You will need: soil pellet, measuring cup, plastic cup, water

- 1 Place one soil pellet in a plastic cup (or other container that can get dirty).
- 2 Add one full measuring cup of water. The markings on the side of the measuring cup help you measure the volumes of substances in the cup.
- 3 Wait ten minutes. Observe what happens to the soil pellet.
- 4 If the soil pellet is not completely expanded after ten minutes, add some more water.



Removing peat from a bog



WHAT'S HAPPENING?

The soil pellet soaks up water and expands. From the tightly compressed pellet, you get loose soil that you can use for planting. Plants need water to grow, and soil can hold a lot of water! Your soil pellets are made of ground and compressed coco fibers. These fibers are extracted from the shells of coconuts.

Most potting soils are made of peat, which comes from raised bogs. These are unique habitats for many rare animal and plant species. Every year, huge quantities of peat are mined, which destroys the raised bogs! Peat-free potting soils are now widely available. They are made of compost or wood fibers. You can help protect the bogs and the animals and plants that live there by using peat-free potting soils.



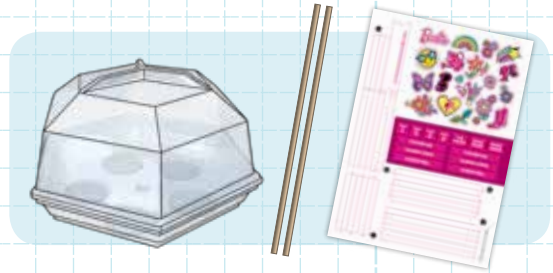
BUILD

The Greenhouse

Let's get the greenhouse ready for use in your experiments!

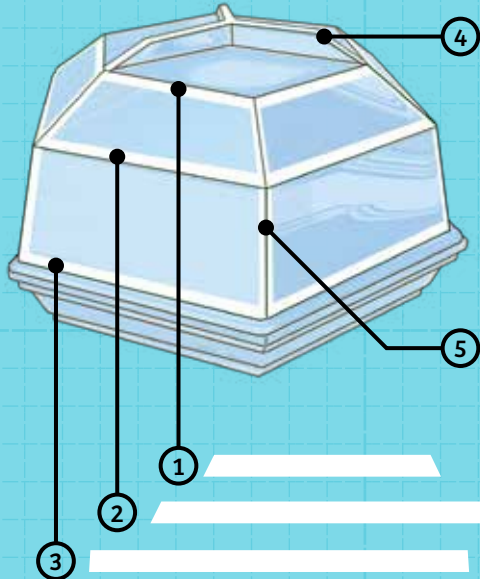
You will need: greenhouse, sticker sheet, 2 wooden sticks, scissors

- 1 Affix the thin, white stickers to your greenhouse. The picture shows you which strips belong in which spot. The longest strips are the hardest to stick. An adult can help you with this!
- 2 Now you can decorate your greenhouse with the colorful stickers. Place the stickers wherever you want on the greenhouse.
- 3 Finally, cut the wooden sticks in half with scissors. Stick the plant label stickers on them as shown, making double-sided labels with the sticks in the middle.



1

Vertical stickers



Horizontal stickers

2



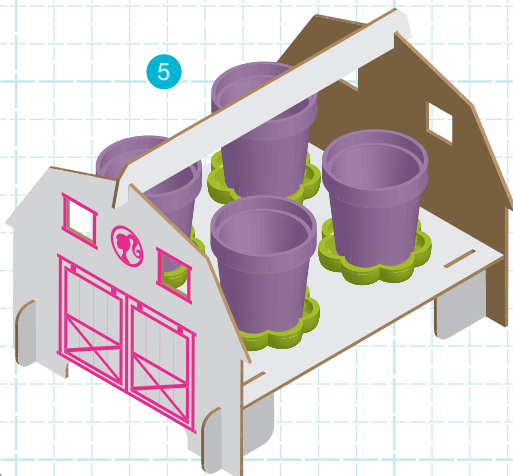
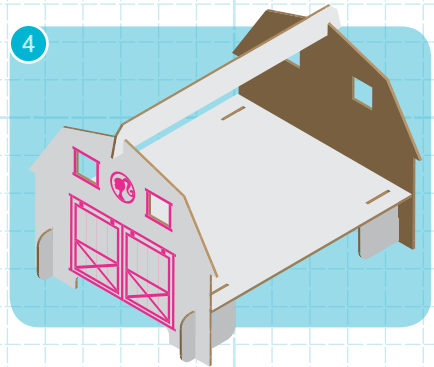
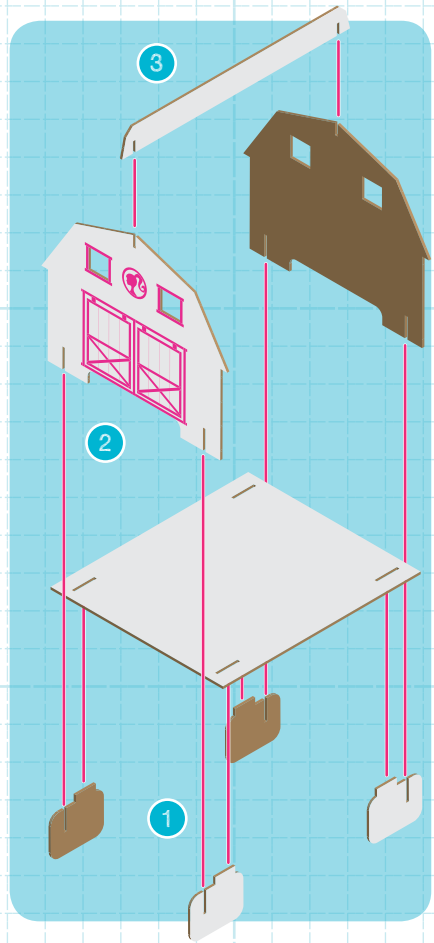


BUILD

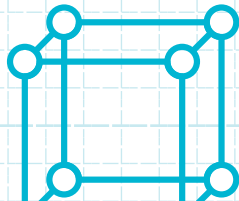
The Plant Holder

You will need: cardboard plant holder pieces, small pots, small dishes

- 1 Insert the four foot pieces into the four slots in the platform piece, one at a time and from the bottom, as shown. Have a helper hold some of the parts in place if you are having trouble.
- 2 Insert the barn-shaped front and back sides of the plant holder into the slots in the feet, as shown.
- 3 Insert the cross bar into the slots in the tops of the two sides.
- 4 The plant holder is assembled! Push all the pieces together tightly.
- 5 Now you can put the small pots and dishes onto the platform and use it as a plant stand. You can decorate it too.



Note: The plant holder is not designed to be lifted by the cross bar!





The girls followed Jane into a greenhouse on the edge of the farm. It was warm and humid inside the greenhouse.

“This is called seed starting,” said Jane. “We plant the seeds in small containers, add water, and let them germinate. Germinate means the plants begin to grow. Everything that the seed needs in order to germinate, except water, is inside the seed.”

“This is so cool!” said Nikki, “But why do we start seeds inside instead of in the garden?”

“We start the plants in the greenhouse so that the young plants can be warm and protected from the environment. After germination, plants need water and light in order to grow. They also need nutrients in order to grow big and produce nice vegetables. The greenhouse can keep the warm, humid conditions that are perfect for growing plants. Once the plants are big and strong enough, they can be transferred outside into the fields to grow even larger. We use a lot of scientific devices in the farm to monitor the growing conditions: rain gauges, thermometers, a weathervane. I’ll show you how they work.”

“I have an idea. Let’s do some science experiments to learn about what things plants need to grow,” suggested Barbie.



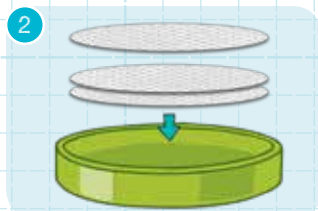
EXPERIMENT

What Do Plants Need?



You will need: 4 small pots with dishes, large dish, plant holder, soil pellets, spatula, pipette, measuring cup, cress seeds, paper towels, water, sunny windowsill

- 1 Fill four small pots with soil from the soil pellet. (See the first experiment for instructions on expanding the soil pellet.)
- 2 Put a few layers of paper towel, trimmed to fit, in the large pot dish.
- 3 Open the packet of cress seeds. Sprinkle some cress seeds on top of the soil in the four small pots and also onto the paper towel in the large pot. Don't plant the seeds too close together, or they will crowd each other and will not grow well.
- 4 Fill the measuring cup with water. Using the pipette, drip water from the measuring cup onto the seeds in the four pots and the dish. Water them so that the soil and the paper towel are completely saturated.
- 5 Set the plant stand on a windowsill. Place the four small dishes onto the plant stand. Put the four pots on the dishes. Place the large dish next to the plant stand.
- 6 Wait three to six days for the cress seeds to germinate (sprout) and grow taller. Water daily, or whenever you notice the soil or paper towel have dried out. Little plants are also called seedlings.
- 7 Observe the cress sprouts. What do you notice about the sprouts in the pots and the sprouts on the paper towel?
- 8 Use the pots of cress in the experiments on the next page. Keep the sprouts in the dish growing to see what happens.



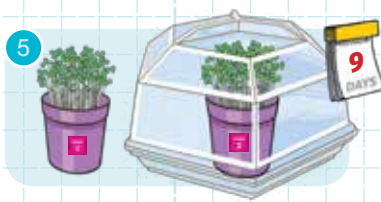
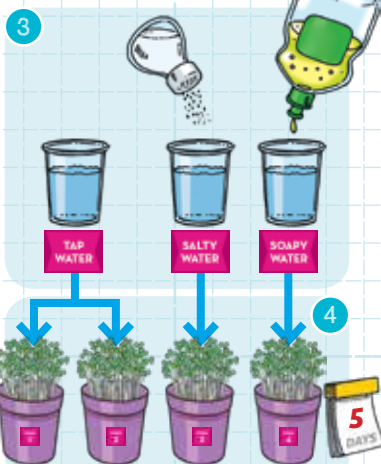


EXPERIMENT

Cress Tests

You will need: 4 pots of cress from previous experiment, sticker labels, greenhouse, 3 plastic cups, table salt, dish soap, spoon

- 1 Label the small pots "1" through "4."
- 2 Fill the three plastic cups with water.
- 3 Label the first cup "tap water." Stir one teaspoon of salt into the second cup and label it "salty water." Stir one teaspoon of dish soap into the third cup and label it "soapy water."
- 4 Now and for the next five days, water the cress plants in pots 1 and 2 with tap water; water cress pot 3 with salty water; and water cress pot 4 with soapy water. Use a different spoon for each type of water, or clean the spoon completely between using each type of water. What happens to the plants in all four pots? What can you conclude about the effects of the salt and soap on the plants?
- 5 Put pot 2 in the greenhouse and keep pot 1 outside of it. Keep both on the windowsill. For the next nine days, water both pots the same amount. What happens to the plants?



WHAT'S HAPPENING?

It's easy to observe germination and growth with cress plants because they sprout quickly. Seeds contain all of the food, or nutrients, that young plants need for their early growth, so they can also grow on a damp paper towel. The cress doesn't like the water with the soap or salt in it. Here, these additives are called contaminants. The test samples shrivel because salt and dish soap have a harmful effect on plants. External conditions are very important when growing plants. In order to thrive, they need nutrients.

Plants also need water, warmth, and air. In the greenhouse, the warmed air isn't carried away as easily as outside, which is why the plants grow faster there than outside of it. You can buy vegetables from supermarkets even in the winter, thanks to large-scale greenhouses. It would be too cold in many parts of the world to grow plants outside during the winter, but in a greenhouse it is warm even during the colder months.





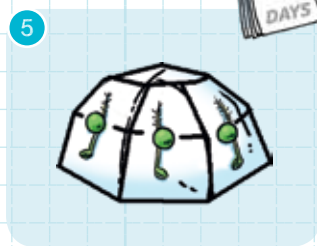
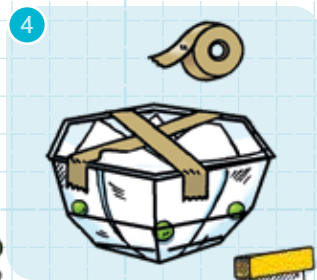
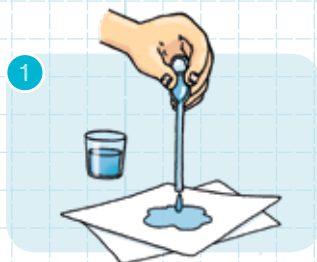
EXPERIMENT

Pea Roots

You will need: pipette, pea seeds, greenhouse, paper towels, water, tape, sunny windowsill

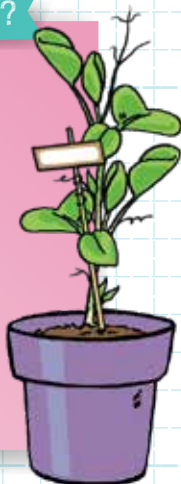


- 1 Wet two paper towel sheets with the pipette.
- 2 Put three pea seeds into the greenhouse dome and place the paper towels on top of them.
- 3 Fill the rest of the greenhouse dome with crumpled-up paper towels, enough to push the peas against the side of the dome.
- 4 Put some tape across the bottom of the greenhouse dome to keep everything packed in place. Place the greenhouse dome back on the greenhouse.
- 5 Wait a few days. Observe each day. Keep the paper towels moist. What happens?
- 6 Continue with the experiments on the next page.



WHAT'S HAPPENING?

It's easy to observe the peas sprouting through the transparent sides of the dome. After a few days, little roots will make their appearance out of a tiny hole in the side of the pea. After a few more days, you will clearly see the roots growing downward. Now, turn the dome upside down so the roots point up. You will observe that the sprouts can tell the difference between up and down, and the roots will soon start growing downward again! You can plant the seedlings in a pot afterward.





EXPERIMENT

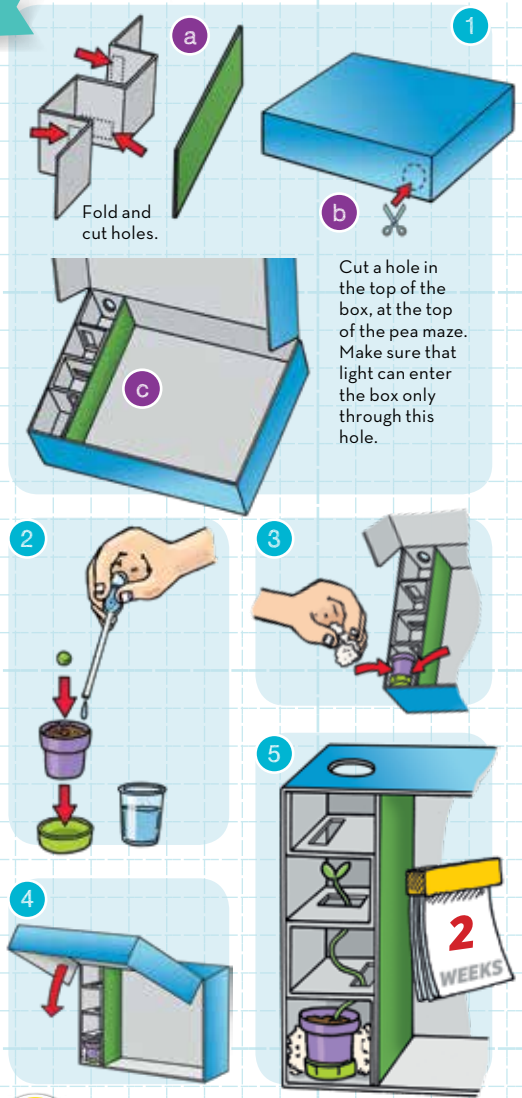
Pea Maze

You will need: pea seedling from previous experiment, small pot, small dish, soil pellet, pipette, *water, shoe box, scrap cardboard, scissors, tape, cotton balls, sunny windowsill*



- 1 Now you can construct a pea maze, as shown in the images. Use a box and scrap cardboard (for example, from a shoe box or cereal box). An adult needs to help with the cutting and assembly of the maze.
- 2 Plant one of the peas you sprouted into a small pot, put it in a small dish, and put it in the bottom of the maze.
- 3 You can pack some cotton balls around the pot so it stays in place.
- 4 Let the plant grow for two weeks. Check the pot daily to make sure the soil is moist. Water as needed. Open the box carefully so you do not disturb the plant or pot. After watering, close the box carefully.
- 5 What did the pea plant do inside the maze as it grew for two weeks?

Note: You can plant the rest of the pea seeds whenever you like. First sprout them by soaking them in water overnight.



Fold and cut holes.

Cut a hole in the top of the box, at the top of the pea maze. Make sure that light can enter the box only through this hole.



WHAT'S HAPPENING?

Your plant senses the direction the light is coming from and grows toward it. It can even wind its way through a maze over the course of a few weeks! This works because the side of the stem that is darker grows faster, so the stem bends toward the light.

Barbie and Nikki conducted a number of experiments with plants over the next few weeks. They had to be patient, because plants take time to germinate and grow.

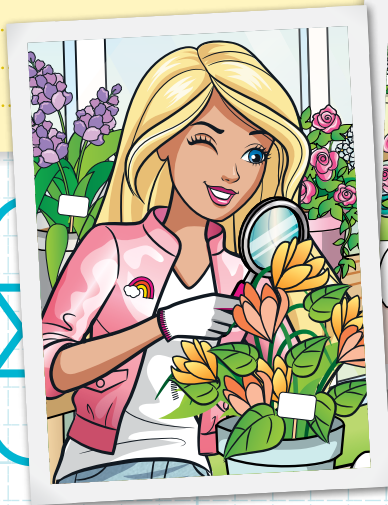
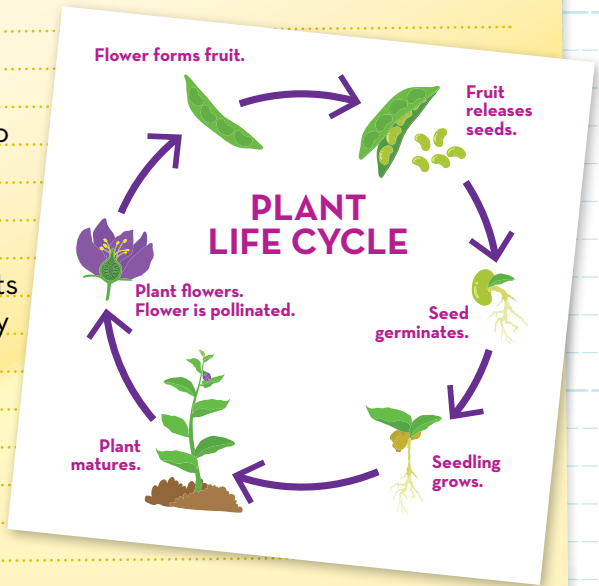
On their next visit to the farm, they told Jane about everything they had learned from their experiments.

“I’m really impressed by your experiments,” Jane said to them. “Would you like to learn more about flowers, and try some more experiments with flowers?”

“Definitely!” Nikki responded. “I’ve always been fascinated by flowers. Why do plants have flowers anyway?”

“Flowers are part of a plant’s life cycle,” Jane explained. “Flowers form fruits when they are pollinated – by bees, for example. The fruits release seeds. The seeds germinate and grow into seedlings, which then mature into adult plants. The adult plants flower and the cycle repeats!”

“Wow, what a beautiful process!” Barbie said. “Nature is amazing.”





EXPERIMENT

Sorting Flower Seeds

You will need: flower seed packet, wooden stick, large pot, large dish, soil pellet, sheet of white paper, water, sunny windowsill

- 1 There are six types of flower seeds in the seed packet. Carefully pour some of the seeds onto a sheet of white paper.
- 2 Using these pictures and a wooden stick (or tweezers), find a few of each of the six types of seeds.
- 3 You can plant the seeds you just found in the large pot. **Save 1/2 measuring cup of seeds for the seed bombs (next experiment).** You don't want to plant too many at the same time, because they will crowd each other when they grow.
- 4 Keep the pot in a sunny window and water it whenever the soil gets dry.
- 5 When the plants get too large for the pot, you can transplant (move) them to a larger pot or to your garden outside.



Centaurea Cyanus
Common name: cornflower or bachelor's button



Linum Grandiflorum
Common name: Scarlet flax



Calendula Officinalis
Common name: Marigold



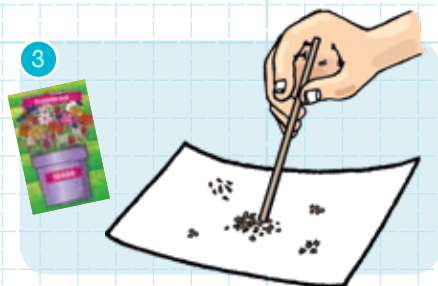
Cosmos Bipinnatus
Common name: Garden cosmos



Leucanthemum Ircutianum
Common names: Aster, Daisy

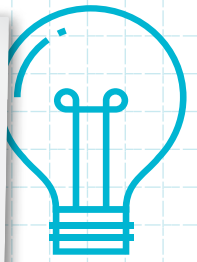


Lavatera Trimestris
Common name: Annual mallow



WHAT'S HAPPENING?

Seeds and plants come in a huge variety of shapes and sizes. You can tell them apart based on their characteristics, like seed shape, leaf size, flower color, fruit shape, and so on. There are about 400,000 different species of plants on Earth. A biological species is a group of lifeforms that can breed (reproduce) together but cannot breed with other groups.



“I have an idea. Plants need soil, water, light, and air to grow,” started Barbie. “So if we make little bundles of soil and seeds, we could spread them around outside and the rain and sunlight would cause the seeds to grow. We could throw them anywhere.”

“And if we used flower seeds,” added Nikki, “then it would be like spreading little bundles of joy around the neighborhood when the flowers bloomed.”

“I know how to make something like this. We call them seed bombs,” said Jane. “I’ll show you. We just need to be careful where we throw them, in case people don’t want flowering plants in those spots! We can use seeds for annuals, which only live for one growing season, so we don’t introduce invasive species into the local ecosystem.”

THE FLOWERS IN THIS KIT



Centaurea Cyanus
Common name: cornflower or bachelor's button
Flower color: Blue



Linum Grandiflorum
Common name: Scarlet flax
Flower color: Red



Calendula Officinalis
'Pacific Beauty mixed'
Common name: Marigold
Flower colors: Yellow to orange mixture



Cosmos Bipinnatus
'Sensation mixed'
Common name: Garden cosmos
Flower colors: White, pink, magenta (mixed)

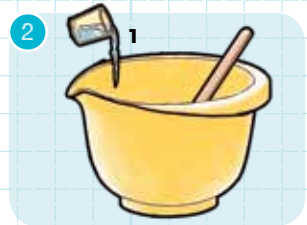
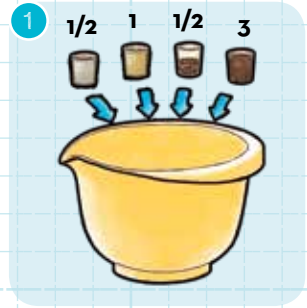


EXPERIMENT

Seed Bombs

You will need: measuring cup (30 ml), 1/2 measuring cup of plaster, 1 measuring cup of sand, 1/2 measuring cup of flower seeds, wooden spatula, plastic molding tray, newspaper, 3 measuring cups of potting soil, 1 measuring cup of water, large plastic bowl

- 1 Cover your work area in newspaper. Put the plaster, the sand, seeds, and the soil in the large bowl. Stir the dry ingredients with the spatula until they are evenly mixed. Be careful not to stir up dust.
- 2 Gradually add one measuring cup of water and mix it into a smooth dough, free of lumps. Add more or less water depending on the dampness of the soil you used. Shape the seed bombs right away before the mixture gets too hard!
- 3 Either put the mixture into the molding tray or make small balls out of it.
- 4 Let the seed bombs harden for a few hours. If the weather and season are right, you can then throw them outside right away! If you want to save them longer, store them in a box. Or you can wrap them in some gift wrap, label them, and give them to your family and friends.



WHAT'S HAPPENING?



The soil and the water ensure that the seeds have everything that they need to start to grow. The sand and the plaster protect the seeds and prevent your seed bomb from coming apart too quickly.



Leucanthemum Irkutianum
Common names: Aster, Daisy
Flower color: White outer petals with yellow center



Lavatera Trimestris
Common name: Annual mallow
Flower color: White, pink, magenta (mixed)



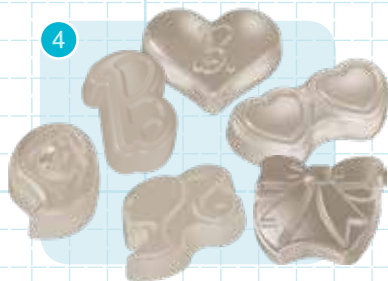
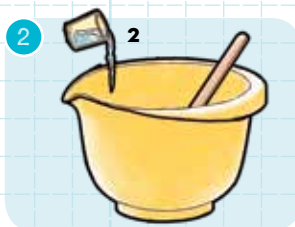
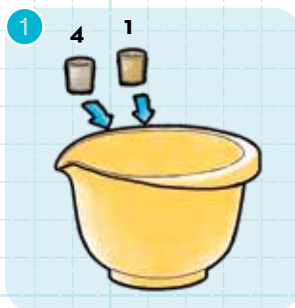
EXPERIMENT

Garden Stones

In this experiment, you can make some small decorative garden stones which you can place around your plant pots in the greenhouse or on the plant holder.

You will need: measuring cup (30 ml), 4 measuring cups of plaster, 1 measuring cup of sand, wooden spatula, plastic molding tray, newspaper, 2 measuring cups of water, large plastic bowl, plastic spoon, paint (optional)

- 1 Cover your work area in newspaper. In a plastic bowl, mix four measuring cups of plaster with 1 measuring cup of sand with the spatula. Be careful not to stir up dust.
- 2 Add two measuring cups of water and stir until the mixture is smooth, with no lumps.
- 3 If you want your garden stones to have a rough, stone-like texture, sprinkle a little sand in the mold cavities before pouring the plaster in. If you want smooth stones, don't sprinkle the sand in the mold. Pour the plaster mixture into the mold before it hardens.
- 4 Wait a few hours for the plaster mixture to harden. Then you can pop the stones out of the mold cavities. If you have extra sand left over, you can make a rock garden with the sand and stones. You can also paint the stones if you want colorful garden stones.



Rock garden





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