

# STEM

*gems*

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the **NATIONAL  
AFTERSCHOOL  
ASSOCIATION**

**big** IDEAS

## INDOOR LAWN

### PLANTS

Plants are incredibly important to the Earth's ecosystem. They not only form the basis of all food chains, but millions of years ago they actually changed Earth's atmosphere from poisonous carbon dioxide to breathable oxygen. Today, plants are still hard at work, cleaning up carbon dioxide, and replacing it with fresh oxygen. Plants need four things to grow: nutrients, water, carbon dioxide and sunlight. Plants create their own food using a chemical process called photosynthesis. In photosynthesis, special cells use sunlight to break down carbon dioxide and water and turn it into sugar. The plant then uses this sugar to sustain its growth.

### SEEDS

Most plants grow from seeds, a compact package that contains everything a plant needs to grow and reproduce. Some seeds, such as grass, begin life with one leaf. These kinds of seeds are monocots. Other seeds, such as beans, begin life with two leaves. These kinds of seeds are dicots. The outside covering of seeds is called the seed coat. It protects the baby plant, or embryo, inside the seed. A plant embryo contains the precursor tissues for the leaves, stem, and root. As a seed develops, the stem and leaves always grows upward, and a root always grows downward. Even when the seedling is turned upside down, the plant will right itself. Surprisingly plants can sense the gravitational pull of the Earth. The seed also contains endosperm, or a food supply, that the embryo uses to grow until the plant can manufacture its own food from sunlight. The food supply in a seed will last up to two weeks. In order for seeds to grow into plants, they need soil containing nutrients, water, sunlight, the right temperature, room to grow, and time.



**GERMINATE:** Put out shoots and begin to grow. | **PLANT:** Organisms that create their own food through the chemical process of photosynthesis.  
| **PHOTOSYNTHESIS:** The process by which green plants use sunlight to synthesize foods from carbon dioxide and water. | **SEED:** A flowering plant's unit of reproduction, capable of developing into another such plant.



# engage



Spring is in the air! All around us warmer temperatures and longer days are causing plants to put out new shoots and turn green. Ask young people:



**What do you need to live and grow?** *Food, air, water, a place to live, sunlight and protection from cold.*



**What do animals need to live and grow?** *Food, air, water, a place to live, sunlight and protection from cold.*



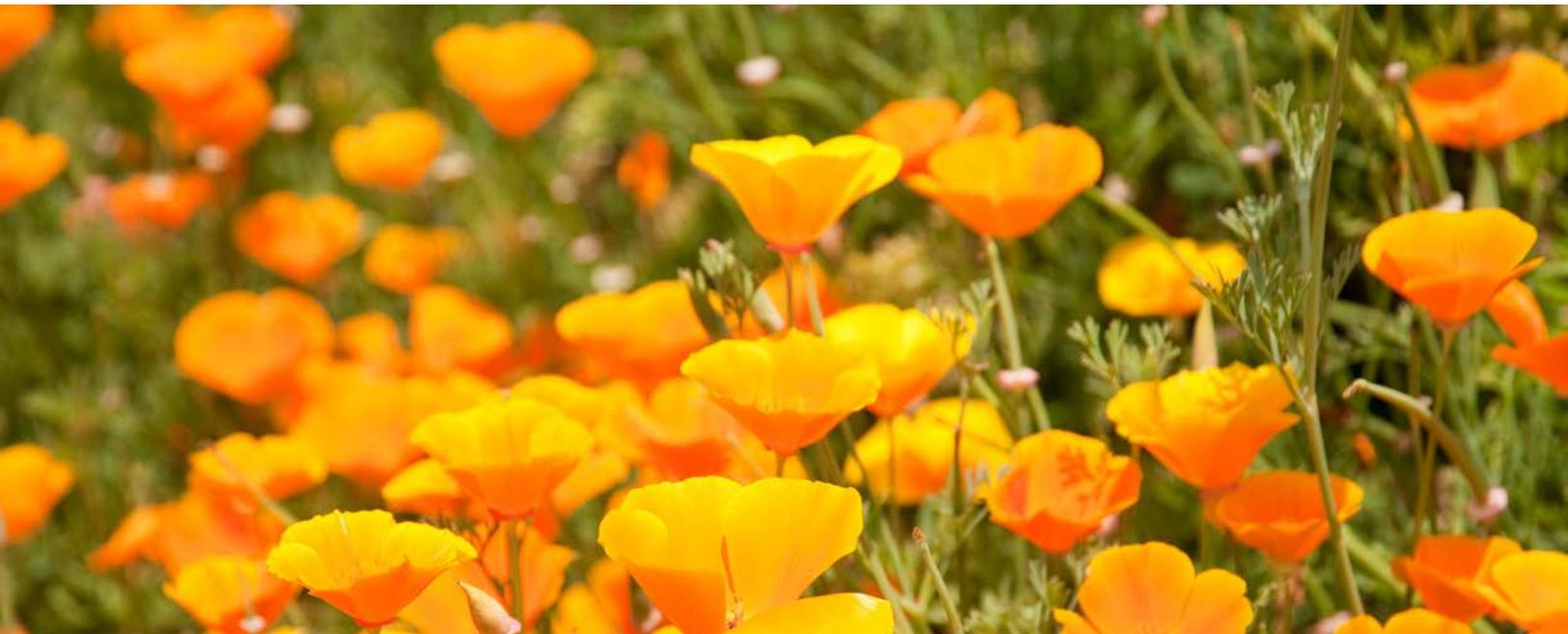
**What do plants need to live and grow?** *Soil containing nutrients, water, sunlight, the right temperature, room to grow, and time.*



**How are plants different from other living organisms?** *Plants cannot move to better location, but just like other living things plants need food, air, water, and a place to live.*



**Why do plants make seeds?** *Seeds grow into new plants. Plants cannot move and seeds are designed to be carried to new places by the wind or animals.*



# what

## YOU WILL NEED & before YOU BEGIN

For each group of young people, you will need the following:



1 Brand New Clean Kitchen Sponge



½ a Packet of Grass Seed *(Any Variety)*



A Plastic Plate



1 Cup of Water



1 Gallon Sealable Baggie



Hand Lenses *(optional)*

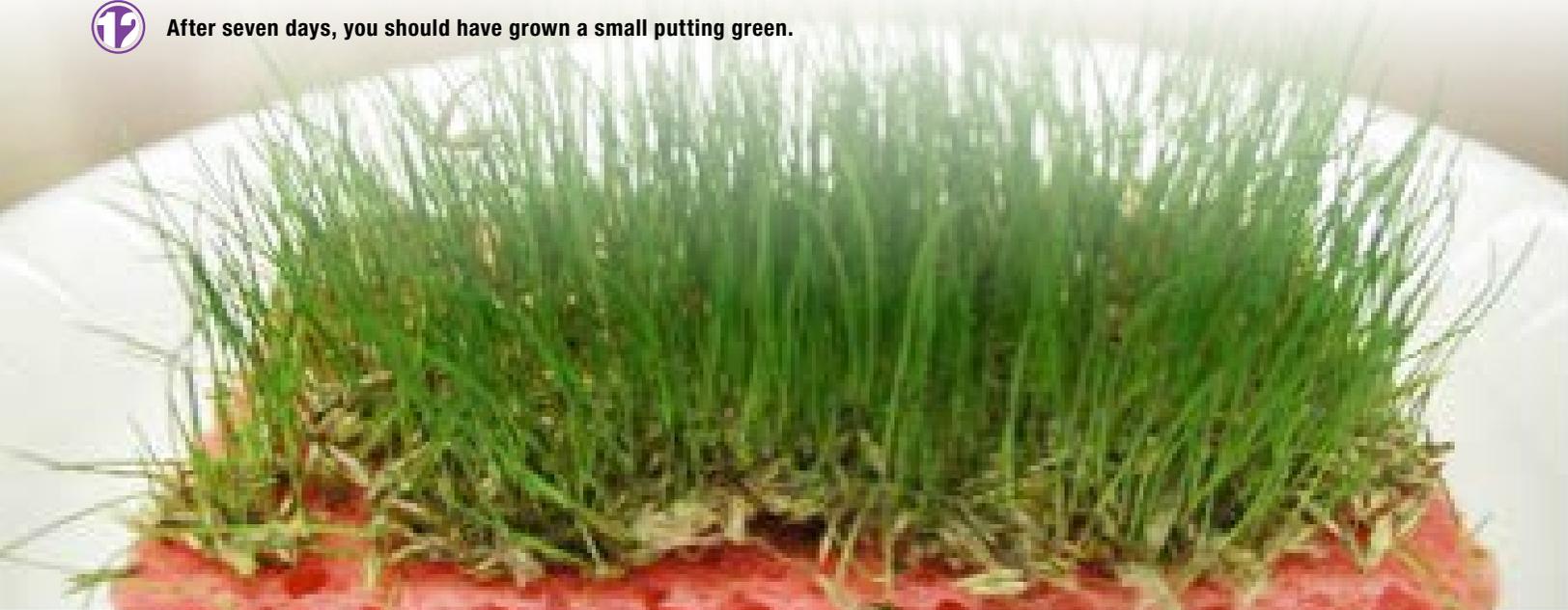


1 Straw

Fill cups with water. Decide the best place to keep the mini greenhouses so they can sit undisturbed.

# EXPLORE & EXPERIMENT

- 1** Tell the group that they are going to investigate what a plant needs to grow, by growing an indoor lawn.
- 2** Have young people divide into groups and distribute a set of materials to each group.
- 3** Have everyone take a seed and describe what it looks like. Use hand lenses if available.
- 4** Have each group take the sponge and thoroughly wet it in cold water then gently squeeze out the excess water and place the sponge on the plastic plate.
- 5** Invite each group to sprinkle their grass seed to cover the sponge.
- 6** Have groups place their sponges inside their plastic baggies.
- 7** Ask the groups to seal their baggies around the straw and inflate them by blowing into the straw. When the baggie is filled with air have everyone pull their straws out, and seal the baggie to trap the air inside.
- 8** Explain to groups that they have now made a mini inflatable green house. Have the groups place their mini greenhouse in a sunny spot, such as a window sill.
- 9** Invite groups to check on their greenhouses every day and note any changes. If the plate dries out, then simply have them add a few drops of water. The baggies should keep the water in by creating a mini water cycle.
- 10** After two days, the seeds should start to germinate. They will look white and fuzzy. Do not worry this is science at work. The white strands are the roots seeking a home in the damp soil (sponge).
- 11** After four days, you will notice that the seeds have sprouted tiny green shoots. This is grass. Each seed will produce one leaf or blade. These kinds of seeds are monocots.
- 12** After seven days, you should have grown a small putting green.





## **make** THE CONNECTION

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**THE MINI- GREEN HOUSES CREATED PROVIDED PLENTY OF SUNLIGHT, WATER, AIR, AND ALLOWED THE SEEDS TO FLOURISH USING THE NUTRIENTS THAT WERE PACKED IN THE SEED. HOWEVER, THE SPONGE IS NOT SOIL AND DOES NOT CONTAIN NUTRIENTS TO SUPPORT THE GRASS LONG TERM. TO CONTINUE THE EXPERIMENT, THE GRASS CAN BE PEELED OFF THE SPONGE AND PLANTED IN A SMALL POT WITH SOIL CONTAINING THE NECESSARY NUTRIENTS.**

Today, some farmers grow plants like tomatoes and lettuce without any soil. They are grown under special lights, using a sterile sponge like material that can hold a lot of water. To ensure that the plants grow strong and healthy, the farmers blend just the right amount of nutrients into the water. Growing plants without soil is called hydroponics. With hydroponics plants can be grown indoors away from bugs and pests, in cold climates, in cities and even in space. Hydroponics is helping us grow food more quickly and efficiently and with a much higher yield than traditional soil based methods.

## EXTEND & EVALUATE

Invite kids to keep a greenhouse journal and note or draw the changes they see day to day on their sponges. Are some of the sponges having more success than others? Have your groups compare and discuss any differences they see between the sponges. What type of conditions affects the growth of the grass? Are some sponges warmer, wetter, or getting more sunlight?

If working with older kids, encourage them to design experiments to determine what influences the growth of their lawns. For example; grow one sponge in the dark, one in direct sunlight, one in the shade or vary the amount of water that each sponge receives, water one sponge every day and another every two or three days. Have kids measure grass growth by recording a daily average length for the blades of grass in a journal.