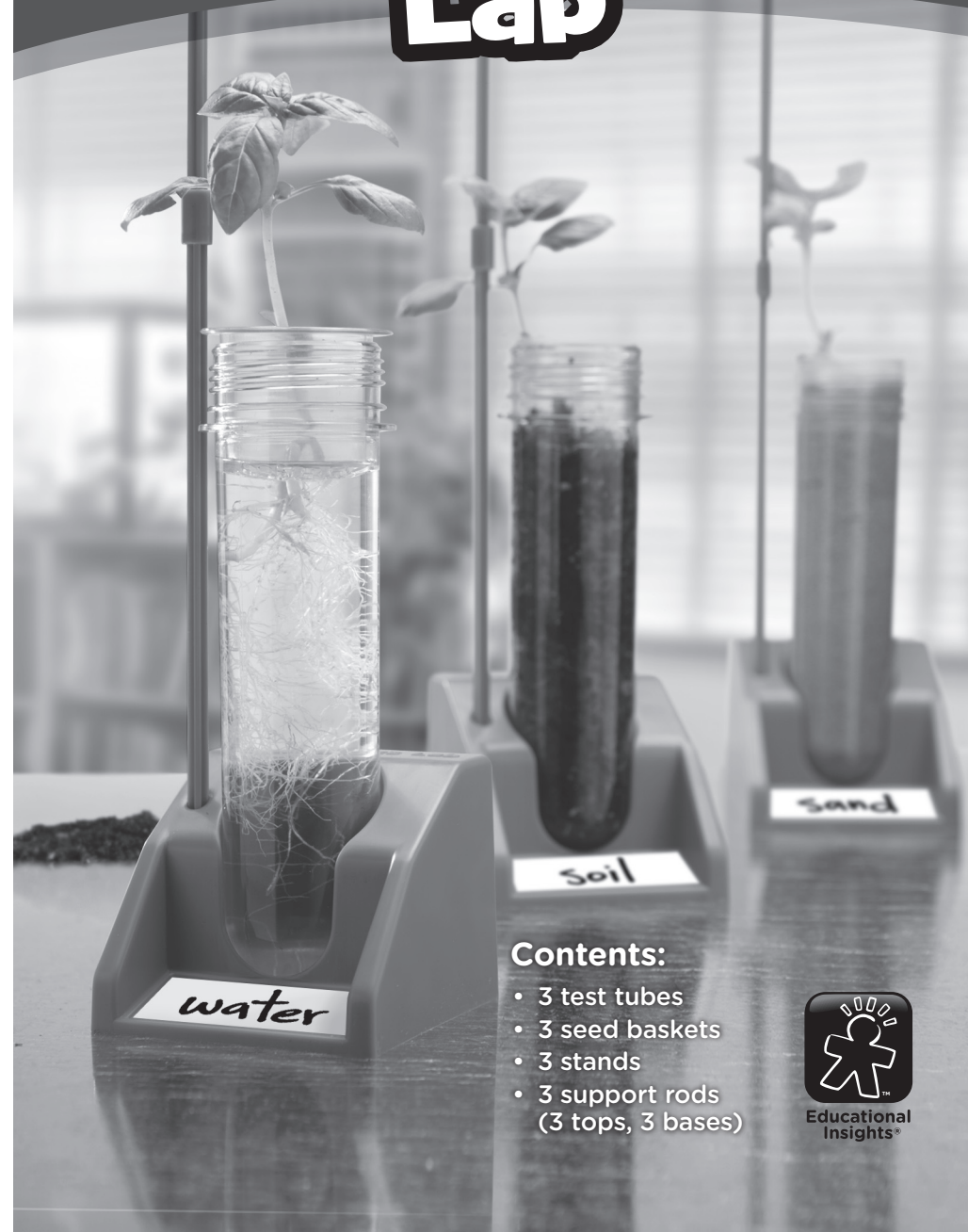


# Hydroponics Lab



## Contents:

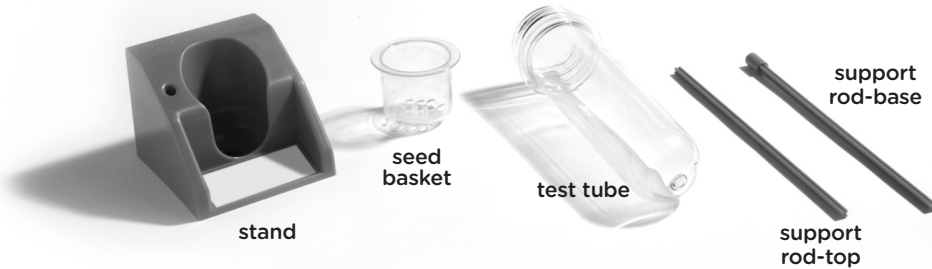
- 3 test tubes
- 3 seed baskets
- 3 stands
- 3 support rods (3 tops, 3 bases)

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Did you know that plants can grow without soil? Welcome to the science of hydroponics! Plants that are grown without soil are grown *hydroponically*. The roots can get their nutrients from water or other media instead of soil. Watch the exciting, hidden world of roots!

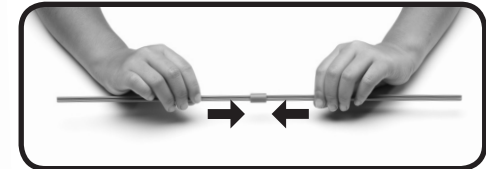


## You will need to provide the following:

- seeds — Use seeds that *germinate*, or sprout, quickly (3-5 days) so that you can get started right away. Read the seed package to find out how quickly your seeds will germinate. Bean or pea plants are good plants to try first.
- a paper towel
- plastic bag
- string or twist ties
- write-on/wipe-off pen
- optional: plant food

## Assembling Your Hydroponics Lab

Set the test tube in the stand. Insert the seed basket into the top of the test tube. To assemble the rod, fit a top into a base to make one long support rod. Slide this long support rod into the hole in the stand. Your Hydroponics Lab is now ready for seedlings!



Fit top into base to make a long support rod.

## Preparing Your Seeds

Germinate your seeds before planting them in the Hydroponics Lab. Here's how:

1. Moisten a paper towel with water.
2. Wrap your seeds in the paper towel, and then place them in a plastic bag. Seal the bag.
3. Wait until the seeds germinate. For bean or pea plants, wait 3-5 days. Look on your seed package to see how long this will take for your seeds.
4. Your plants are now seedlings. Select one seedling to plant in each Hydroponics Lab. Use one test tube per seedling to give your plant roots plenty of space to grow.



germinated seed

## Planting a Seedling

1. Remove the seed basket, and fill the test tube with water.
2. Thread the roots of the seedling through the mesh basket bottom. The roots should hang down below the basket.
3. Gently place the basket into the test tube so that the roots are hanging in the water. The seed basket should be about half full with water.
4. Use a write-on/wipe-off pen to label the stand. You can write the name of the plant or write a variable you are testing (see Be a Scientist! on the next page).
5. Place your Hydroponics Lab near a window or in a sunny area.
6. Water will evaporate with time. Add water every few days to keep the seed basket half full with water. Do not let the water level drop too low or the roots will dry out.
7. If the water becomes cloudy or smelly, you must replace the water. Take the Hydroponics Lab to a sink. Grasp the seed basket and lift it, with the plant in it, out of the test tube. Dump out the water, and then rinse the test tube thoroughly with warm water to clear any debris. Refill the test tube with cool fresh water. Gently replace the seed basket in the test tube so the roots are again hanging in the water. Replace the test tube in the stand.
8. As your plant grows, it may need some support. Use string or twist ties to tie the plant to the support rod.
9. If you wish, add plant food to the water. Follow the directions on the plant food to see how much to add.



## Cleaning Your Hydroponics Lab

When you are ready for a new planting project, you must clean your Hydroponics Lab. Use warm water and soap to clean out the test tubes and seed baskets. Allow to air dry before using again.

## Be a Scientist!

Your Hydroponics Lab is perfect for conducting controlled experiments! When you conduct a controlled experiment, you keep all variables the same except the one variable you are testing.

Here are some questions you can answer by conducting a controlled experiment with your Hydroponics Lab:

1. Does this plant grow best in water, soil, or sand?

Plant three seedlings. Put water in one test tube. In the other test tubes, put moist soil and moist sand. You do not need a seed basket for the soil and sand tubes. Instead, plant the seed directly in the soil or sand. Label each plant with the type of medium in which it is growing.

2. Does plant food cause my plant species to grow taller?

Plant two seedlings. Put equal amounts of tap water in each test tube. In one of the test tubes, add plant food. Follow the directions on the plant food to see how much to add. Write *plant food* on the label. Write *control* on the other label.

3. Does this plant species grow better in tap water, bottled water, or distilled water?

Plant three seedlings. Put equal amounts of water in each test tube. However, give one plant tap water, another bottled water, and a third distilled water. (Find distilled water in your local supermarket.) Label each plant with the type of water it has in the test tube.

4. Does this plant species grow better in sunlight, shade, or artificial light?

Plant three seedlings. Put equal amounts of water in each test tube. Place one test tube next to a window, place another in a shady spot in your house, and a third under a lamp. Label them *sunlight*, *shade*, and *artificial light*.

# Hydroponics Lab

Every few days, observe your plants and record your data in a science journal. Record the day (how many days the plant has been growing). Measure the plant height (above the seed basket or soil line) and root length. If the plants are growing in water, you can measure the roots by briefly pulling out the seed basket and holding a ruler next to the roots. If possible, take photos of the plants and attach the pictures to the appropriate place in your journal. If you cannot take photos, draw pictures of what the plants look like. Observe the plant and write down your observations.

For each plant that you grow, draw a chart in your science journal like the one on the next page. Every few days, fill in another line on the chart. When you are finished, make separate line graphs showing the plant and root growth.

Think of some more questions you would like to answer. What would YOU like to find out about your plants?

Use your Hydroponics Lab for your next science fair project!

Plant: \_\_\_\_\_

Observations								
Root length								
Plant height								
Day								