

HANDS-ON ACTIVITY

Needs for Growth



Even the largest plants usually start out as small seeds. Inside a seed is a tiny plant. On the outside, the seed has a coating that protects the seed and its contents. When conditions are just right for a seed to sprout and grow, the tiny plant pushes open the coating and grows toward the sun. As it grows, it gains more mass, or matter.

Form a question What question do you have about how the mass of a plant changes over time?

Did you know?

One type of palm tree has the world's largest seed. It is 30 cm (1 ft) long and can weigh up to 18 kg (40 lb).

Use the table below to show the mass of a seed or seedling and its system. Then, carefully measure a plant that is six weeks old.

| | Starting mass (g) | Mass after 6 weeks (g) |
|------------|-------------------|------------------------|
| Seed/plant | | |
| Soil | | |
| Pot | | |

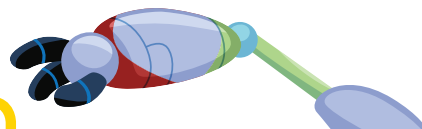


POSSIBLE MATERIALS

- ☐ one-week-old seedling in pot
- ☐ six-week-old plant in pot
- ☐ pan balance or scale

Analyze your data Make a **claim** about the plant's mass. Tell how the **evidence** supports your claim, and explain your **reasoning**.

Briefly tell how you might gather more data to support a deeper explanation of added plant mass.



Making Sense

How does understanding how plants add mass as they grow help you explain how plants can grow without soil?

Plant Needs

Drink It In

All organisms need water to live. Plants contain more water than most other living things. In fact, water makes up 90% of most plants. If a plant does not get enough water, it will wilt, as the plant on the left shows.



Water enters a plant through the roots, travels up through the stem, and spreads out into the leaves. Without enough water, the leaves and stem of a plant become weak and start to droop. Unlike a healthy plant, a wilted plant is not able to make food for itself and survive.

Nutrients

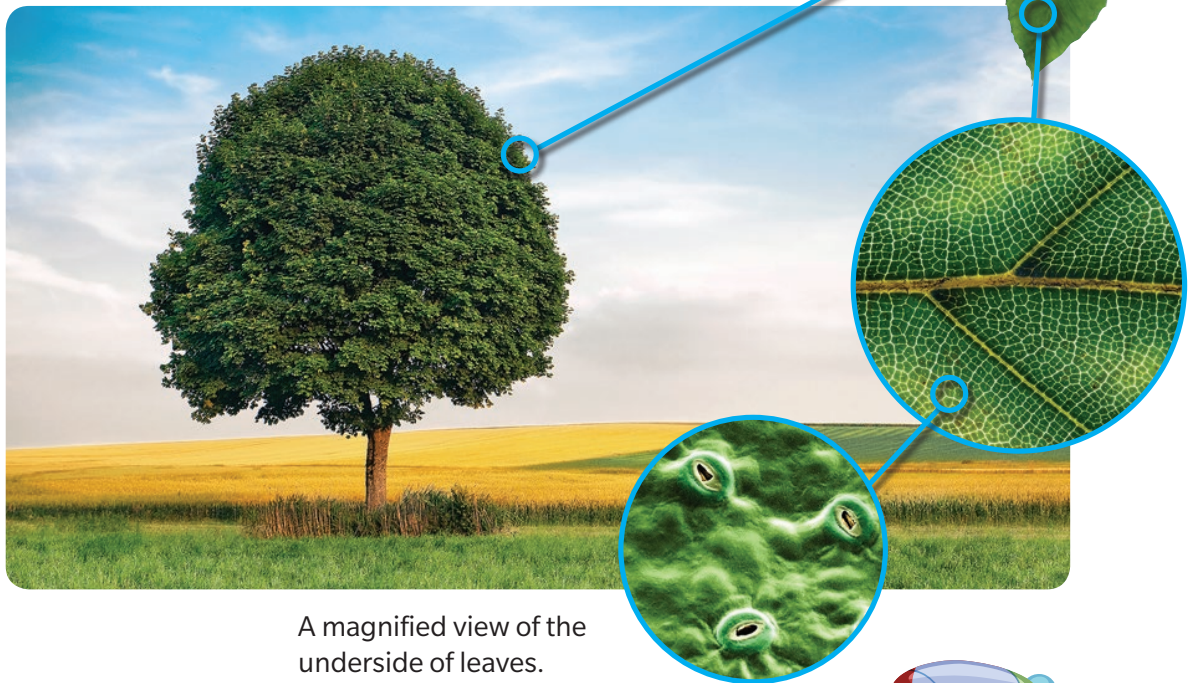
Water is not the only thing plants take in through their roots. Nutrients in the soil are dissolved in the water in the soil, and these nutrients are delivered to a plant via its roots. Nutrients are materials from the environment that plants need to be healthy. In a hydroponic system, where plants are grown in water instead of soil, nutrients are added to the water.

Name three things plants need to grow and thrive.

In and Out

Plants need to take in fresh air and release waste gases. How do they do this? The underside of a leaf has tiny holes that can open and close. Air moves into and out of a plant through these holes.

There are structures on the sides of the holes. The structures control whether the holes are closed or not. When these structures are swollen, the holes are open. When they are shrunken, the holes are closed.



A magnified view of the underside of leaves.

Making Sense

Describe the evidence you have found to support your claim about how plants can grow without soil.



Discuss your answer with your group. Provide constructive feedback for each answer and make sure everyone has a chance to speak.