

SCIENCE EBOOK

Fall Science Projects

Your Kids Will Love



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Take a Nature Walk

Go for a walk outside on a nice day to collect leaves and get a closer look at the changes that are taking place around you with the change of the seasons. Your nature walk will be more fun if you bring someone along to help you collect and observe. Make sure one of the people you take along is a parent or other adult!



What You Need:

- ☐ Plastic bags for bringing leaves and other items home
- ☐ A snack and water bottle if you are going for a long walk
- ☐ Camera to take pictures along the way
- ☐ Notebook and pencil to help you remember things you see but can't take home
- ☐ Backpack or sturdy bag to keep it all in

Things To Collect:

1. Leaves in every fall color you can find (look for yellow, orange, red, brown, purple, and even green ones). When you get home, press the leaves between sheets of newspaper and some heavy books for a few days until they dry out. That way they will stay flat and keep their beautiful colors instead of curling up and looking dead.
2. Leaves or “needles” from trees that don’t lose their leaves in the fall. Compare them to the leaves you gathered that came from trees that do lose their leaves. How are they different? How are they similar?

3. **Leaves from plants that are not trees.** Compare these leaves with the needles and leaves you gathered from trees. Did you find any leaves from plants that were changing color? Some plants that are not trees have leaves that will change colors and fall off, but most of the time, the whole plant that is above the ground will die and grow back from its roots in the spring. Some plants don't grow back in the spring at all – they only live for one growing season.

Things To Notice:

Most animals, plants, and trees are preparing for the winter during the fall months. Squirrels are gathering and storing food and finding homes that will provide them with shelter from the cold. Plants lose their flowers and leaves, or else start to die, even though their roots might live through the winter. Except in very warm places, trees are losing their leaves to prepare for winter. Some trees also drop their seeds in the fall. The seeds get buried in the ground (sometimes they just get covered up by falling leaves) where they will be protected until springtime when they can start to grow into new trees. Grass also starts to turn brown as it gets colder.

Are most of the leaves on a tree the same color, or do you see more than one color of leaves on the same tree?

Do you see more trees that stay green and don't lose their leaves during the fall or trees that do lose their leaves?

How does the grass look in the places you walked? Is it still green? Is some of it turning brown?

Do you notice any flowers blooming?

Do you notice other things falling from trees – such as acorns or seed pods?

If you see any animals, such as squirrels, what are they doing?





Fall Leaf Observation

Here is a picture of the tree:
(Glue a photo or draw a picture)

Here is a sample leaf from this tree:
(Press the leaf between sheets of newspaper and heavy books, then glue it here when it is dry)

Notes about the tree:

Where is the tree located?

What colors are the leaves?

Have leaves started to fall from this tree yet?

Did you see any animals in or near the tree?

Draw a picture of animals, seeds, or other things you saw near the tree:

Here is a rubbing of a leaf from this tree:

(Put the leaf under this paper and rub over it firmly with the long side of a crayon.)

What Color Are Leaves?



What You Need:

- ☐ A few green leaves from 3 different kinds of trees
- ☐ 3 small drinking glasses
- ☐ Rubbing alcohol
- ☐ Plastic wrap
- ☐ A pan of hot tap water
- ☐ Coffee filters or filter paper
- ☐ Scissors
- ☐ Tape
- ☐ 3 pencils

What To Do:

1. Tear the leaves into small pieces. Put the pieces from each tree into different glasses (make sure each glass only has pieces from one type of tree).
2. Get an adult to pour rubbing alcohol into each glass so that all the leaf pieces are covered. Put a piece of plastic wrap over the top of each glass to keep the alcohol from evaporating (getting soaked up by the air).
3. Let an adult set the glasses in the pan of hot water and leave them for about 30 minutes. Check to make sure the alcohol in each glass has turned green before you take them out. If it hasn't, refill the pan with hot water and put the glasses back in until the alcohol turns green.
4. While you wait, cut 3 strips out of the middle of the coffee filters. Make each strip about 1 inch wide. Tape one end of each strip to the middle of a pencil. Cut the other end of the strip into a point.

5. Once the alcohol in each glass has turned green, take the glasses out of the hot water. Set a pencil with the paper strip taped to it over each glass so that the paper strip hangs down and the point touches the alcohol in the glass. If the paper is too long, roll some of it around the pencil to shorten it.
6. Let the glasses and papers sit for about 30 more minutes and then check to see if anything is happening. You should see the green color start to soak up on the paper. Wait even longer to see if any other colors come out!

What Happened:

The alcohol and the heat from the hot water made the color in the leaves dissolve so you could see it in the alcohol.

It is similar to what happens when you make tea. When you put a tea bag (filled with tea leaves) in a cup of hot water for a few minutes, the water becomes colored and flavored by the tea leaves.

When you put the paper strips into the green-colored alcohol, the colors started to get soaked up by the paper and you should have seen a couple different shades of green.

If you waited long enough, you might have been able to see other colors from the leaves appear on the paper – such as orange or yellow. If you saw colors besides green, those are the colors that the leaves will change to in the fall! Did you see any difference in the colors from the different kinds of leaves you tested?

The reason you couldn't see all those colors in the green leaves or in the alcohol solution is because the chemical that causes the green color is much stronger than the chemical that causes orange and yellow. When you put the paper into the alcohol solution, the colors had a chance to separate, and the orange and yellow were no longer covered up by the green. The same thing happens when leaves start to change colors – the chemical that makes them green starts to go out of the leaves, leaving the chemicals that make other colors behind, turning the leaves all the pretty colors of fall!



Autumn Equinox and Changing Leaves

In September, we officially say farewell to summer as the autumnal equinox ushers in the first day of fall.

Equinox (say: ee-KWUH-nox) comes from the Latin word *aequus* (equal) and *nox* (night).

Around the equinox, which occurs once in spring and once in fall, there are nearly equal hours of day and night. So during the autumnal and vernal (spring) equinox, daytime and nighttime both last 12 hours! After the autumnal equinox, the hours of sunlight each day slips away due to the earth's tilt and orbit around the sun.

The days get shorter, the temperature starts to drop and fall settles in, eventually giving way to winter.



Changing Leaves

In addition to losing sunlight, autumn, also called fall, reveals many other changes as well. The most obvious change occurs with leaves. Although leaves look different in the fall than other times of the year, those flaming reds and yellows are actually there all along—we just can't see them! Different chemicals in leaves cause them to change colors in the fall. Chlorophyll is the chemical responsible for leaves' green color as they make food through photosynthesis during the spring and summer months. But in autumn, when it gets cooler outside and the sun doesn't shine as long each day, trees begin storing up food for winter.

To do that, the chlorophyll in the leaves starts to break down and the food that the leaves have been making is stored inside the tree instead of the leaves. Now that the chlorophyll is gone, instead of being green, the leaves become all the pretty colors of fall,

like orange, yellow, red, or even purple! Even though the other colors were there all along, we couldn't see them because the green from the chlorophyll blocked them.

Chlorophyll and the other chemicals that cause the colors in leaves are called pigments and are also used to the dye thread and fiber that clothes are made from. Other colors in leaves come from chemicals called **carotenoids** (say: kuh-ROT-in-oidz) and **anthocyanins** (say: anthuh-sahy-uh-nin).

Carotenoids make leaves yellow, orange, and brown and are always in leaves, just like chlorophyll. Anthocyanins take credit for colors like red and purple, but not all leaves have it. Anthocyanin is formed when sugar gets trapped in a leaf after the chlorophyll is gone. Then, when the leaf is exposed to sunlight, the anthocyanin turns leaves red and purple!

Falling Leaves

As the weather gets cooler and the days get shorter in the fall, trees start to prepare for winter. Trees use sunlight to make a special layer or seal between each leaf and the branch it is connected to. Then the leaves fall easily to the ground, leaving the branches of the tree protected from the cold that will come in the winter and also helping the tree store up food!

Since leaves have water inside their cells, they can't survive freezing temperatures, because the water would freeze and the leaves would die.

When leaves fall to the ground, they eventually break down and provide nutrients for the soil, helping prepare for more plants to grow in the spring and also create a layer that helps the ground absorb water. Another reason trees lose their leaves is because many of them get torn or damaged during the spring and summer by weather (such as hail stones), insects that eat leaves, or diseases that trees can get. Since they lose their leaves in the fall, they will be able to grow brand new ones in the spring.



Preserve Autumn Leaves

Glycerin Method

There are many methods to preserve leaves. One method is to put them into a glycerin/water solution. This will preserve your leaves yet leave them relatively flexible. This preserving method works because the natural moisture present in the leaves is replaced by the glycerin solution, maintaining the leaf's texture and form.



What You Need:

- ☐ Glycerin
- ☐ Water
- ☐ Flat pan or disposable gloves
- ☐ Leaves
- ☐ A weight or something to keep leaves submerged

What To Do:

1. Mix the glycerin and water so that it is one part glycerin and two parts water. You only need enough to submerge the leaves — about one cup.
2. Pour the solution into a flat pan, place the leaves in the solution, and then put the weight on the leaves to keep them submerged.
3. Keep the leaves submerged in the solution for 2-6 days.
4. Dry the leaves gently with a paper towel. They should feel soft and pliable.

TIP



Try using two Styrofoam or other disposable plates. Put leaves and enough glycerin solution to just lightly cover the leaves in the bottom of one plate. Then put the other plate on top of the leaves and solution. Now you can put a weight on the top plate without getting the weight in the solution.

Preserve Autumn Leaves

Wax Paper Method

There are multiple methods to preserve leaves. One of the most common ways to preserve leaves is by pressing them between wax paper.

What To Do:

1. Place a leaf between two pieces of wax paper.
2. Put a towel or a piece of thick paper over the wax paper.
3. Press on the towel or paper with a warm iron to seal the wax sheets together. This takes about 2-5 minutes on each side, depending on how moist the leaf is. Once you have finished one side, flip the leaf over and do the other side.
4. Cut around the leaf, leaving a small margin of wax paper to ensure that it will stay sealed.
5. Rather than cutting out the leaves, you may want to try to peel the wax paper off the leaves, leaving a coat of wax behind to protect the leaves. Try this on one leaf first to see if this method works for you.

What You Need:

- ☐ Leaves
- ☐ Wax paper
- ☐ Thin towel or paper
- ☐ Iron
- ☐ Ironing board



Preserve Autumn Leaves

Microwave Method

There are multiple methods to preserve leaves. Thanks to everyday technology, you can preserve autumn leaves using your microwave.

What To Do:

1. Arrange the leaves on top of two paper towels. Lay another towel over the leaves to cover them.
2. Microwave the leaves for 30-180 seconds. *Be very attentive and careful.* Leaves that are cooked in the microwave too long can catch fire. The drier the leaves, the less time they will need. Leaves that curl after removal from the microwave have not been in long enough. Leaves that are scorched have been in there too long. Only dry them for a few seconds at a time.
3. Let the leaves sit for a day or two and then finish by spraying an acrylic sealant on both sides of the leaves.
4. Compare the texture and color of the leaves after using the different preserving methods. Did one method work well for a particular tree species, but another method worked better for a different tree species? What do you conclude about what happens to the leaves during the different preserving processes? If you'd like, use a tree identification guide to help identify the leaves of different species.

What You Need:

- ☐ Fresh leaves that have not dried out
- ☐ Paper towels
- ☐ Microwave
- ☐ Acrylic spray from a craft store

