Sun Plant Prints

Grade: 1-2

Time: 2hr+

Activity Overview :

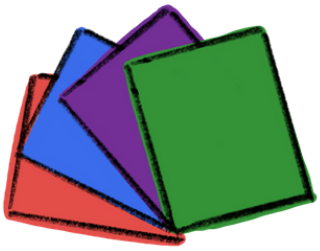
Today we are going to learn about the effects of UV rays from the sun while making a beautiful piece of art at the same time! We will be making prints of different leaves and flowers on a piece of coloured paper using only the power of the sun. We will compare the effects of UV rays in direct sunlight, indirect sunlight, and shade by seeing how our prints look when made in these three conditions.

Before we begin think about the following questions:

- What do you wear outside to protect yourself from getting a sunburn?
- Why is it important to protect ourselves from the sun?
- What kind of trees, bushes, and flowers grow in your neighbourhood?

Materials:

- Coloured paper (construction or printer paper, as long as it is not glossy, 3 or more pieces)
- Clear plastic wrap
- Medium sized rocks
- Leaves and flowers



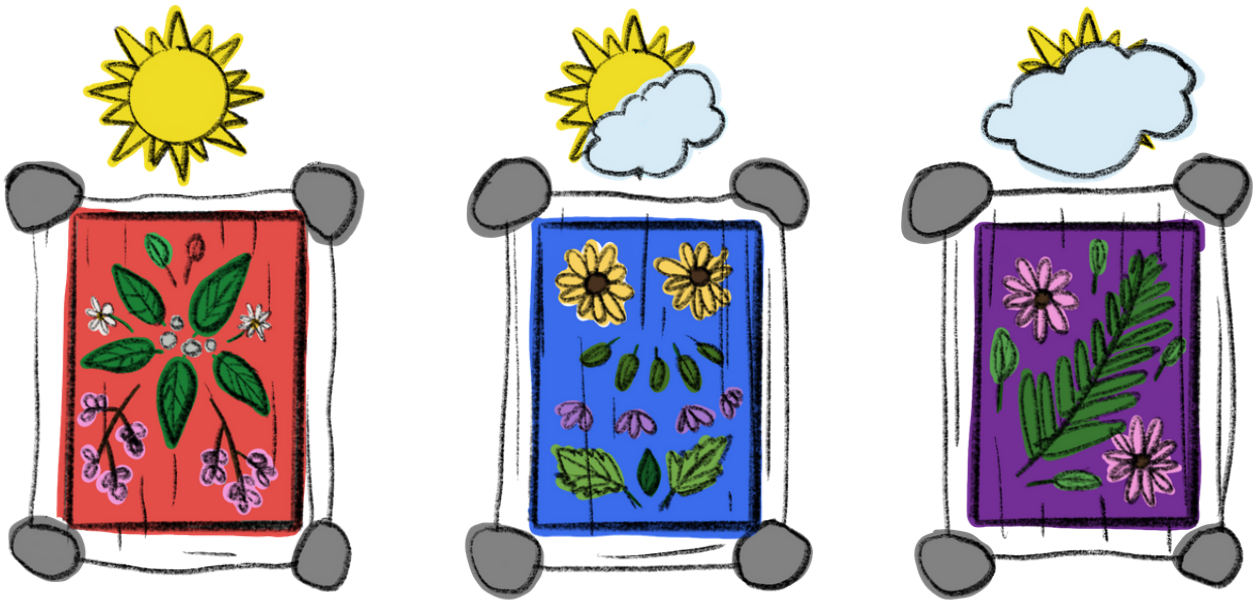
Don't worry if you don't have all these supplies. Experiment with other everyday items and see what you can make!

Activity:

1. In your backyard or neighbourhood, look for various leaves and flowers you would like to make a print of.
2. Make sure the leaves and flowers you choose are flat, we will be pressing them down on the coloured paper with the plastic wrap.
3. Check out the "Leaf and Flower Identification" worksheet on page to see if you can identify the leaves and flowers you found for your print!
4. Before you start making your print, think about how you want to organize your leaves and flowers on your paper. Do you want to make a pattern? Do you want to put leaves on one paper and the flowers on another?
5. After you have collected your leaves and flowers and have decided what pattern you are going to make, place your plants on the three pieces of coloured paper.
6. We are going to see what the effects of UV rays are in direct sunlight, indirect sunlight and shade. To do this, you will need to find three spots in your backyard or driveway, ones that receive direct sunlight, indirect sunlight and shade.
7. Place one piece of coloured paper in direct sunlight, the second in indirect sunlight, and the third in shade. If you want to make multiple prints, place a few more pieces of paper in direct sunlight.

Step 1 - 4

Step 5 - 8



8. Cover the paper in a layer of clear plastic wrap and hold down the edges of the paper and plastic wrap with rocks so the wind does not blow them away.

9. Leave the prints outside in the sun for at least two hours, you can leave them out longer if you want more distinct outlines of the plants.

10. After two hours, take the plastic wrap, leaves, and flowers off of the coloured paper. You should see an outline of the plants on your paper! Where the plants were the paper is its original colour and the area around the plants has been lightened by the sun.

Step 10

- Place the prints that you made in direct sunlight, indirect sunlight, and shade side by side.

- On which print can you see the outline of the plants most clearly? On which print is the outline of the plants least visible? Are there any prints where there appears to be no plant outline?

Engineering and Science Connections

The reason why the sun prints formed is because of UV rays from the sun. Light from the sun travels to the earth in wavelengths of different sizes. Some of these wavelengths are the reason we can see colours and the world around us, this is known as visible light. Some of these wavelengths we cannot see, such as UV rays or infrared rays.

Infrared rays are what makes sunlight feel warm and they have longer wavelengths than visible light. UV rays (short for ultraviolet radiation) have shorter wavelengths than visible light, meaning it has more energy than visible light, and it can affect our skin and health.

So what does this have to do with our sun plant prints? When UV rays from the sun hit the coloured paper, they have enough energy to change the chemical make-up of the dye used to colour the paper. The areas of the paper that are exposed to the sun will lighten due to the energy of the UV rays breaking down the chemical bonds in the dye. The parts of the paper that were covered by the plants were not exposed to UV rays from the sun (the plants blocked them) so they did not change colours. This is why you were able to make a sun print!

You likely found that the prints that were in direct sunlight turned out the best (you could see the outline of the plants most clearly). This is because that paper received the full strength of UV rays from the sun without any protection. The prints placed in indirect sunlight likely still showed an outline of the plants you placed on the paper. This is because UV rays can reflect off of surfaces such as concrete or grass, meaning that UV rays still reach your paper, lightening the unprotected areas. The prints placed in the shade likely didn't change very much, but you may have noticed a slight outline of your plants. Again, this is because UV rays can reflect off of surfaces, so even when you are in a shady spot, you can be exposed to UV rays!

As you can see from our experiment, UV rays are very powerful, even if you are not in direct sunlight. UV rays can cause damage to our skin, such as when we get a sunburn. It is very important that we wear sunscreen when we go outside, even if we are not in direct sunlight or on cloudy days, because UV rays can reflect off of different surfaces and still reach our skin. It is also important that we wear clothing that protects our skin from the sun, such as bathing suits with long sleeves.

Extensions:

Sun prints using sunscreen!

Through this experiment we have learned why it is important to wear sunscreen to protect ourselves from UV rays. To test out how well our sunscreen works, we will try making sun prints with it instead of using plants!

- Place a piece of coloured paper in direct sunlight.
- Cover the paper is a sheet of plastic wrap.
- Hold down the sides of the paper and plastic wrap with rocks so it does not blow away.
- Take some sunscreen on your finger and draw a pattern on top of the plastic wrap with it, make sure the layer is not too thin (you can see the whitecast of the sunscreen).
- Leave the paper out in the sun for at least two hours.
- Take the plastic wrap off of the paper to reveal your design!
- The paper should have remained its original colour wherever the sunscreen was because the sunscreen blocked out the UV rays from the sun. Wherever you did not put sunscreen should have lightened in colour because it was not protected. How well did your sunscreen block out UV rays?

Share your creations!

Don't for get to share your experiments and creations with us! We would love to see what you've made. You can Email us at: esqinfo@uwaterloo.ca or send us a message/tag us on our social media!

Facebook: @uwengoutreach **Twitter:** @UWEngOutreach **Instagram:** @uwengoutreach

Thanks for exploring, discovering, and learning with us!

3, 2, 1 Done!

3 - Write or draw 3 things you learned from this activity

2 - Write or draw 2 things you found super interesting or cool and want to learn more about

1 - Do you have any questions about the activity? Did something make you wonder...what if? how? or why?