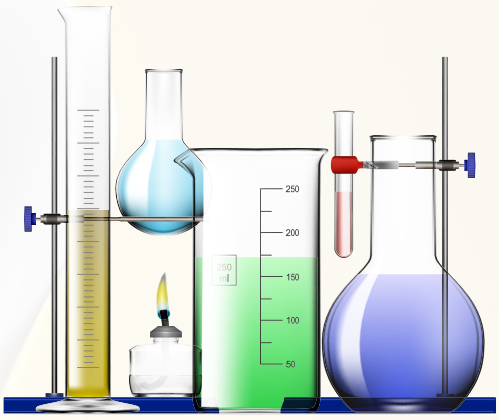
CHEMICAL CHANGES

A chemical change is a type of change that results in the formation of new substances with different chemical properties and characteristics. From cooking and baking to chemical reactions in the atmosphere, chemical changes are happening all around us.

Chemical changes occur when substances react to form new substances with different chemical and physical properties. This reaction is called a chemical reaction and it is characterized by changes in energy, color, and other physical properties.

An example of a chemical change is when iron reacts with oxygen to form iron oxide, also known as rust. The rust has different properties than the iron, it is a different color and is more brittle. Another example is the reaction of baking soda and vinegar, which produces carbon dioxide gas and a new substance, sodium acetate.

Chemical changes can also be identified by energy changes such as heat or light being released or absorbed during the reaction. This is why chemical reactions are often accompanied by heat or light.



CHEMICAL CHANGES

Try these easy to set up chemical reaction experiments you can do at home or in the classroom.

MAGIC MILK

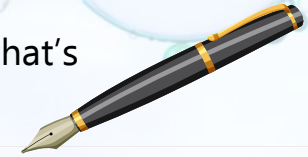
The chemical reaction in this magic milk experiment is fun to watch and makes for great hands-on learning.

VINEGAR PLASTIC

This milk and vinegar plastic experiment is a terrific example of kitchen science!

INVISIBLE INK

Find out how to make your own invisible ink! Simple chemistry that's perfect to do at home or in the classroom.

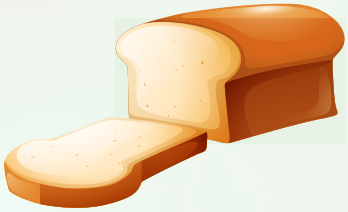


GREEN PENNIES

Explore the science in your own kitchen or classroom by making green pennies!

RUBBER EGG

Find out why this rubber egg experiment is a classic must-try science activity you can set up in minutes in the classroom or at home!

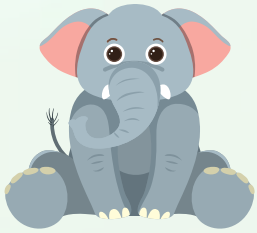


BREAD IN A BAG

This bread in a bag activity for kids is a great way to develop math, science, and even fine motor skills!

WHY DO APPLES TURN BROWN?

Let's try to answer these burning apple science questions with an apple oxidation experiment.



ELEPHANT TOOTHPASTE

If you have a kid who loves to whip up bubbling, frothing brews, then this elephant toothpaste experiment is a MUST!

PHOTOSYNTHESIS

Here's a simple and fun way to introduce photosynthesis for kids.

MAGIC MILK

This magic milk science experiment is the perfect kitchen science experiment to help understand the science behind 'surface tension'.

SUPPLIES

Full Fat Milk
Food Coloring
Dawn Dish Soap
Cotton Swabs
Heart cookie cutter

INSTRUCTIONS

STEP 1: Start by pouring your milk into a baking dish or another flat bottom surface. Just enough to cover the bottom. Add the cookie cutter.

STEP 2: Next you want to fill the top of the milk with drops of color!

STEP 3: Now pour a bit of your dish soap into a bowl, touch your cotton swab tip to the dish soap to coat it. Bring it over to your milk dish and gently touch the surface of the milk with the soapy cotton swab!

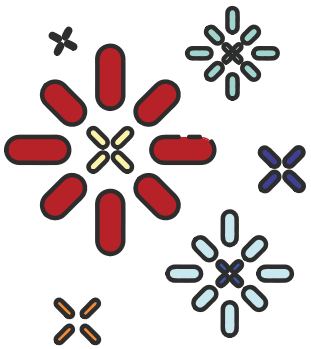
WHAT IS HAPPENING?

Milk is made up of minerals, proteins, and fats. Proteins and fats are susceptible to changes. When the dish soap is added to the milk, those molecules run around and try to attach to the fat molecules in the milk. You wouldn't see this without the food coloring! The food coloring looks like fireworks because it's getting bumped around! The soap heads for the fats creating the cool bursting of color. When there is no more movement, all the fat molecules have been found.


04/30/18
DAWN
SPECIAL VALUE

Magic Milk Observations

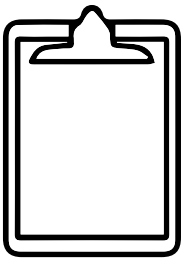
Use this worksheet to process and evaluate your work.



Do you think the temperature of the milk would matter?
Why or why not?

What do you think will happen when you touch the swab to the colors?

Why do you think the colors stop moving eventually?



RECORD

Try the experiment with water. What did you observe?

Try with different types of milk. Was there a difference?

JR-SCIENTISTS

MILK PLASTIC

Earth-friendly and kid-friendly science, make milk plastic!

SUPPLIES

Milk
Vinegar
Sharpies
Cookie cutters
Strainer
Paper towels

INSTRUCTIONS:

STEP 1: Add 1 cup of milk to a microwave safe bowl and heat for 90 seconds.

STEP 2: Mix in 4 tablespoons of vinegar and stir for 60 seconds.

STEP 3: Pour into a strainer and press out all the milk.

STEP 4: Press paper towel into a strainer to remove any leftover milk.

STEP 5: Lay out a piece of paper towel, place a cookie cutter onto the paper towel and press your vinegar milk into the cookie cutter and let set for 48 hours.

STEP 6: Wait the 48 hours and color with a sharpie.

THE SCIENCE

Really, this milk and vinegar experiment does not produce real plastic. The new substance is casein plastic. If you want to explore real plastic polymers, try some homemade slime! Click here to read all about making homemade slime for easy science.

This plastic-like substance forms from a chemical reaction between the milk and vinegar. When the protein in the milk called casein comes in contact with the vinegar, the casein and vinegar do not mix but rather the molecules move around and join forces to make the casein plastic!

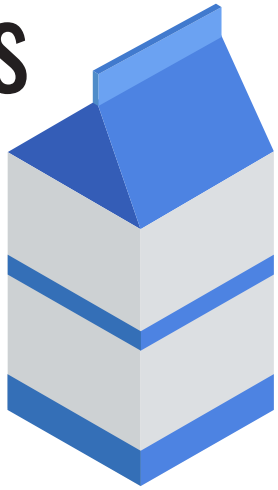

HEINZ
All Natural
DISTILLED WHITE
VINEGAR
meijer


VINEGAR


Sharpie
Permanent Marker

Plastic Milk Observations

Use this worksheet to process and evaluate your work.



What do you think will happen when you add vinegar and milk together?

RECORD

What did you observe ?

Try different types of milk: low fat, full fat, skim. How did they behave?

Try lemon juice instead of vinegar. What happened?

JR-SCIENTISTS

INVISIBLE INK

Can you make a bouncing bubble without it breaking?
Let's find out!

SUPPLIES

Lemon juice
Iron
Paintbrush
Paper
Small bowl
Towel

INSTRUCTIONS:

STEP 1: Cut a lemon or pour juice into a small bowl.

STEP 2: Using your paintbrush, paint a secret message onto your paper.

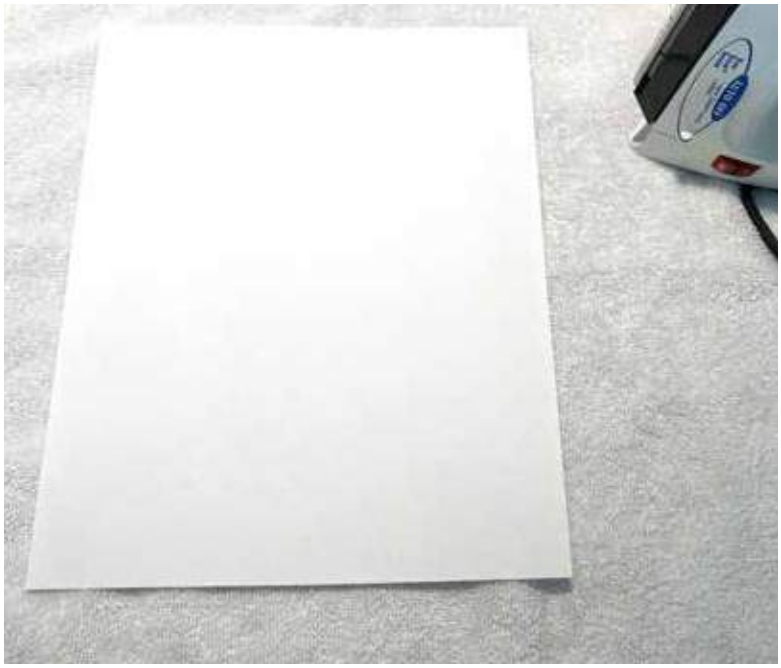
STEP 3: Let your message dry.

STEP 4: With adult help or supervision, press your hot iron onto the paper where your message is. Hold for 15 seconds and lift to reveal the secret!

THE SCIENCE

Lemons are made of organic material. Organic material is made from carbon compounds. The juice is colorless when it's at room temperature, but when you heat the juice with the iron, the carbon compounds break down, releasing the carbon. The carbon then reacts to oxygen in the air (oxidation) which makes the lemon juice turn a darker color.

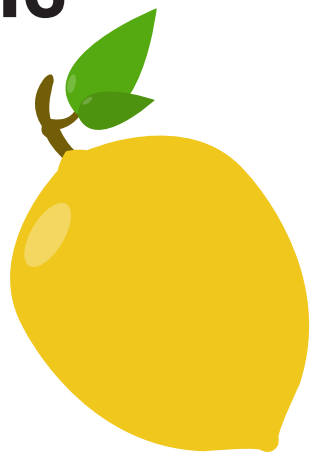
These special 'invisible ink' messages were even used to communicate in World War 1!




Carbon
is
Cool!

Invisible Ink Observations

Use this worksheet to process and evaluate your work.



How does the paper look after you have written on it?
Can you see your message?

What happens when you apply heat to the paper? Why does this happen?

Can you still see the message when the paper is dry?

Try lime juice, orange juice, milk or vinegar. Did they work as well?

GREEN PENNIES

Why is the Statue of Liberty green? It's a beautiful patina, but how does it happen?

SUPPLIES

White vinegar
Salt
Water
Bowl
Teaspoon
Paper towels
Pennies

INSTRUCTIONS

STEP 1: Prep the green pennies experiment by filling 2 small bowls with about 1/4 cup of vinegar and a teaspoon of salt each. Mix thoroughly.

STEP 2: Take one and dip it halfway into the bowl. Count to 10 slowly and pull it out. What happened? Add a few more and let them sit for a few minutes. Make sure to add 6 pennies to the other bowl too.

STEP 3: Now, take the pennies from one bowl and give them a good rinse and let them dry on a paper towel.

STEP 4: Take the other pennies from the other bowl and place them directly on another paper towel.

THE SCIENCE

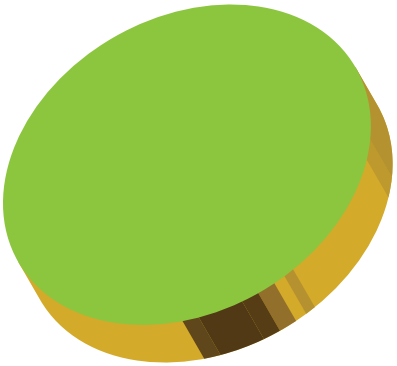
Can you see the differences between the two groups of pennies, the rinsed and unrinsed pennies? Do you now have some green pennies? I bet you do! Your dull pennies should either be green or polished!

Your green pennies have what is called a patina. A patina is a thin layer that has formed on the surface of your copper penny from "weathering" and oxidization from the chemical process we just put the penny through. The Statue of Liberty is covered in a thin layer of copper. Because she sits out in the elements and is surrounded by salt water, she has a patina similar to our green pennies. It would be a huge job to polish her!


Big Y
VINEGAR

Green Pennies Observations

Use this worksheet to process and evaluate your work.



RECORD

What why do some pennies look dull?

So what makes green pennies green?

What is copper?

What does all this have to do with the Statue of Liberty?

JR SCIENTISTS

RUBBER EGG

This rubber egg experiment is a classic science activity!

SUPPLIES

Raw Eggs
Vinegar
Jar/Vase
Food coloring (optional)

INSTRUCTIONS:

STEP 1: Place an egg in the jar and cover with vinegar. You can color the vinegar for rubber eggs too!

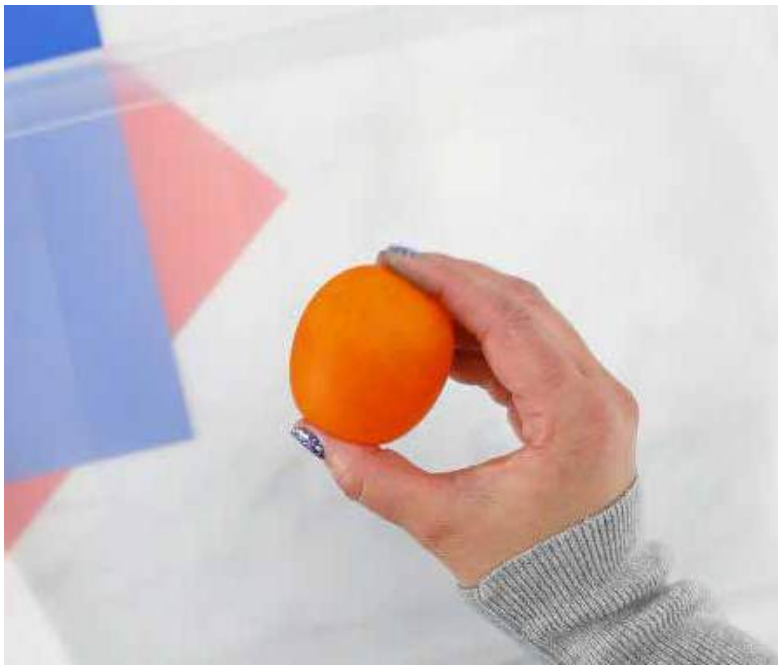
STEP 2: Wait and watch! Notice the bubbles on the eggshell! This is the acid in the vinegar reacting with the calcium carbonate in the shell. This reaction is producing a gas called carbon dioxide!

STEP 3: After 48 hours, remove the egg and rinse it off. Ours had a layer of brown scum that was easily washed away! The hard outer shell is gone and the egg white and yolk are surrounded by a thin membrane.

THE SCIENCE

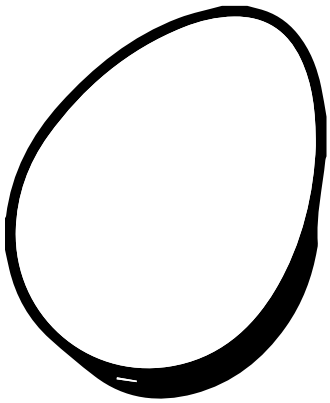
The eggshell gets its hardness from a mineral called calcium carbonate similar to our bones. When you place the egg into the vinegar, you will start to observe bubbles. These bubbles are a chemical reaction between the acid in the vinegar and the base in the calcium carbonate of the eggshell. When an acid and a base mix they form carbon dioxide which is a gas.

The eggshell dissolves and leaves a soft, bendable, squeeze-able, rubber egg. Does it bounce?

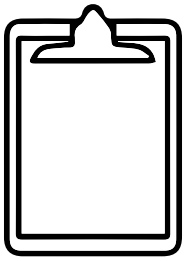


Rubber Egg Observations

Use this worksheet to process and evaluate your work.



Do you think you can make a raw egg bounce?



RECORD

What did you observe day 1? Day 2? What were the differences?

What did your egg look like when you removed it from the vinegar?

Did it bounce? How was that possible?

BREAD IN A BAG

This bread in a bag activity for kids is a great way to develop math, science, and even fine motor skills! Plus, it tastes amazing!

SUPPLIES

3 C plain flour, divided
3 TBSP granulated sugar
1 .25oz packet rapid rise yeast
1 1/2 teaspoons salt
1 cup of warm water
3 tablespoons olive oil
Large zip top bag

INSTRUCTIONS

STEP 1: Before you start, open up your zip-top bag and place it in a large bowl.

STEP 2: Scoop 1 cup flour into a large zip-top bag, with 3 tablespoons sugar, 1 .25oz packet of rapid rise yeast and 1 cup of warm water.

STEP 3: Let the air out of the bag, then seal the bag closed and mix from the outside of the bag with your hands. Let the mixture sit for 10-15 minutes.

STEP 4: Now open the bag and add 1 cup of flour, 1 1/2 teaspoons of salt and 3 tablespoons of olive oil. Seal the bag, and mix again.

STEP 5: Add 1 more cup of flour, seal and mix again.

STEP 6: Remove the dough and knead for 10 minutes on a piece of floured parchment paper to prevent the dough sticking to the surface.

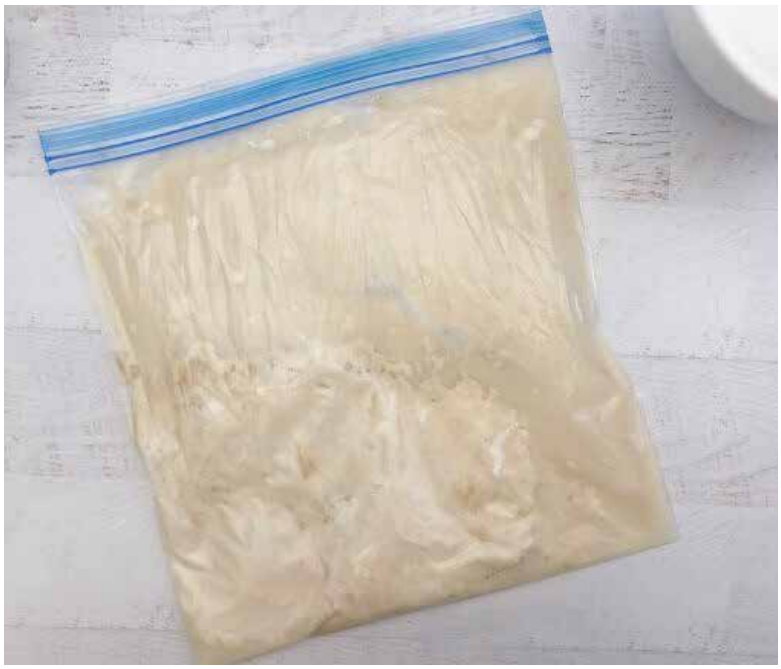
STEP 7: Cover with a warm damp hand towel for 30 minutes.

STEP 8: Bake for 25 min at 375 degrees in a greased bread pan.

THE SCIENCE

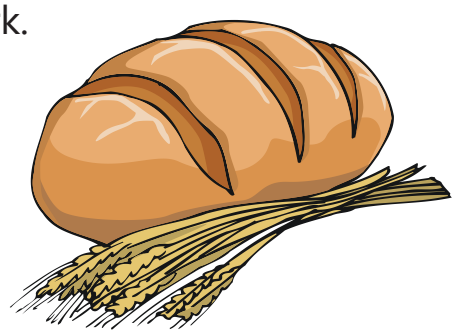
Yeast needs to be combined with warm water and a food source, sugar, to wake up and do its thing. The sugar feeds the yeast and creates the fermentation process. If you notice bubbles forming, that's carbon dioxide gas given off by the yeast as it's eating the sugar. When you cook the bread the yeast dies off so your kiddos will be relieved that they are eating a side of a fungus with their bread.


Fleischmann's
RapidRise
Instant Yeast
FAST-ACTING



Bread in a Bag Observations

Use this worksheet to process and evaluate your work.



What did you learn about yeast?

What do you think the bread would look like without yeast?

Did you observe anything happening when you mixed the yeast?

What did the bread feel like when you kneaded it?

What did you see inside the bread when it was done?

WHY DO APPLES TURN BROWN?

Why do apples turn brown and what can you do about it? Let's find out!

SUPPLIES

Apples
Lemon juice
Paper plates
Knife
Cup

INSTRUCTIONS

STEP 1: Label paper plates with the name of each type of apple you are using.

STEP 2: Cut two wedges of the same size out of each apple.

STEP 3: Place one wedge in a small dish and the other on the plate alongside the rest of the whole apple.

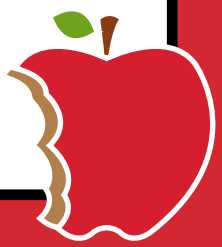
STEP 4: Squeeze a little lemon juice over each slice in the dishes and mix to coat evenly. Dump out excess juice. Do this for each apple.

STEP 5: Now wait and be patient. Be observant.

THE SCIENCE

There's great science behind the process of why an apple turns brown or why rotten spots are brown. The simple science is that when an apple is damaged, even cut into slices, the enzymes in the apple react to the oxygen in the air causing oxidation.The apple produces melanin to protect the apple which is the brown you see.

Lemon juice helps keep the apple from turning brown because it is full of ascorbic acid (Vitamin C) and it has a low (acidic) pH level. Ascorbic acid works because oxygen will react with it before it reacts with the polyphenol oxidase enzyme in the fruit.




GALA


McIntosh

Brown Apple Observations

Use this worksheet to process and evaluate your work.

What do you think will happen when you cut an apple and leave it out?

RECORD

What did your apples look like after 5 minutes? 10? Describe.

Try leaving one apple without adding lemon juice. Was it different?

Which apples turned brown faster?

What have I learned?

ELEPHANT TOOTHPASTE

Explore classic science experiments with a super simple setup, particularly thermogenic reactions!

SUPPLIES

20-Volume hydrogen peroxide
Dry fast-acting yeast
Warm water
Dish Soap
Food coloring
16 Oz container

INSTRUCTIONS

STEP 1: Place down a tray first to catch the eruption. Then pour 1/2 cup of hydrogen peroxide liquid into your container or bottle.
STEP 2: Add about 10-20 drops of food coloring.
STEP 3: Add a squirt of dish soap or about one tablespoon of dish soap and give it a gentle swirl.
STEP 4: Mix the water and yeast in a small container until it's fully incorporated.
STEP 5: Pour the yeast mixture into the hydrogen peroxide/soap mixture and watch what happens!

THE SCIENCE

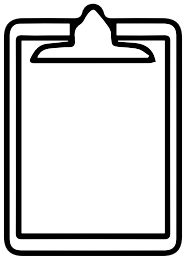
The reaction between the hydrogen peroxide and the yeast is exothermic. You will feel the warmth outside the container because energy is being released.

The yeast (also known as a catalase because it acts as a catalyst) helps to remove the oxygen from the hydrogen peroxide creating tons of tiny bubbles (oxygen gas) that make all that cool foam. The foam is a combination of the oxygen, water, and dish soap you added.


50ml
±5%
40
30
20

Elephant Toothpaste Observations

Use this worksheet to process and evaluate your work.



RECORD

What do you think will happen?

What did you see? How long does the reaction last?

What makes the foam appear?

Try the activity without the dish soap. What was different?

JR-SCIENTISTS
PHOTOSYNTHESIS

Plants make their own food through the process of photosynthesis. Here's a simple and fun way to learn about it!

INSTRUCTIONS

STEP 1: Print the photosynthesis template and color.

STEP 2: Cut out the pieces of the diagram.

STEP 3: Glue the pieces in the appropriate place on another piece of paper to display the photosynthesis process.

SUPPLIES

Template
Markers
Scissors
Glue stick
Blank paper

THE SCIENCE

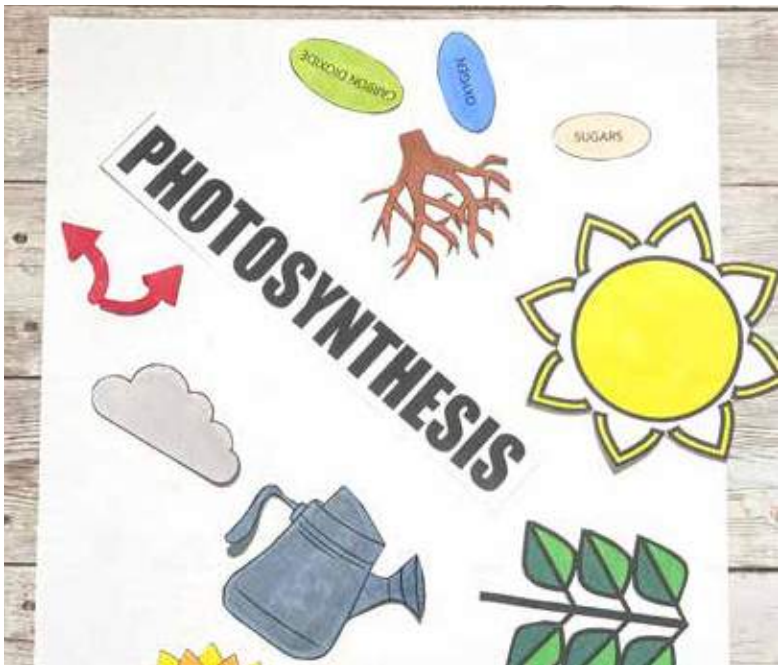
The meaning of the word "photosynthesis" is the combination of two words, "photo" which means light, and "synthesis" which means putting together.

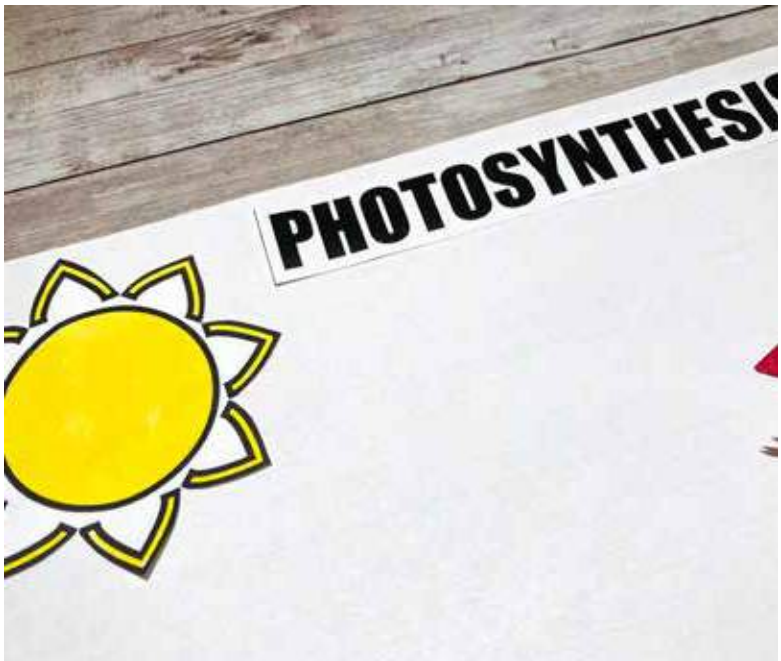
Photosynthesis is the process plants use to make their own food. It is a requirement for all forms of life to survive on Earth. Photosynthesis requires sunlight, chlorophyll, water, and carbon dioxide gas. Plants take in water from the soil and carbon dioxide from the air, and they produce oxygen and glucose (sugar). The plants use some of the sugars and keep the rest in storage. The oxygen they create is released into the air.

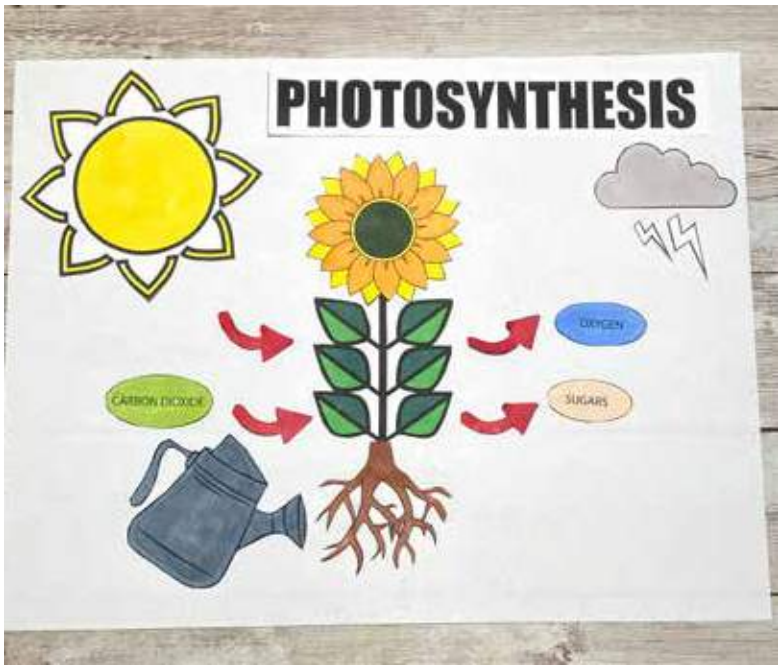

PHOTOSYNTHESIS
CARBON DIOXIDE
OXYGEN
SUGARS


CARBON DIOXIDE

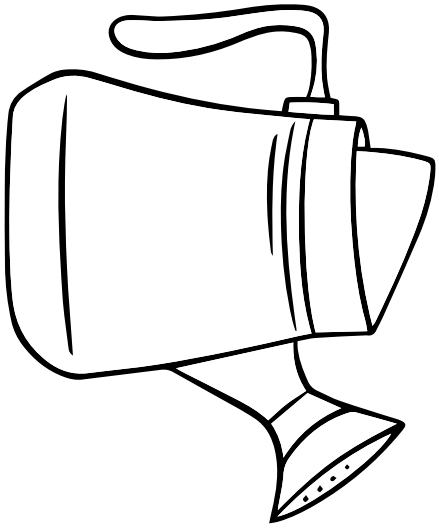

CARBON DIOXIDE
OXYGEN
SUGARS

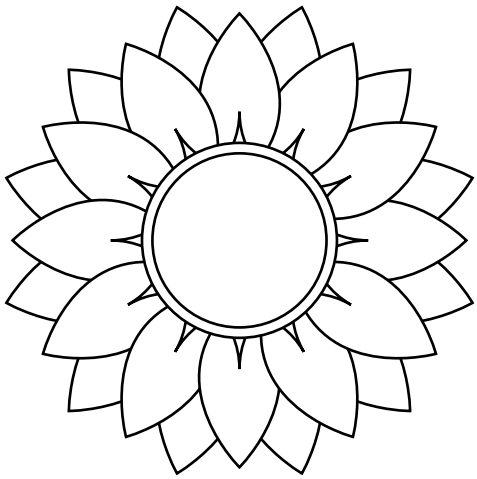

PHOTOSYNTHESIS
CARBON DIOXIDE
OXYGEN
SUGARS

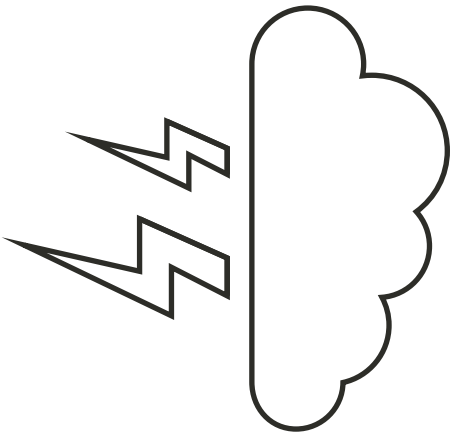

PHOTOSYNTHESIS

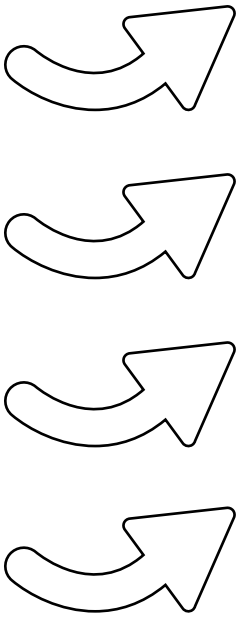

PHOTOSYNTHESIS
OXYGEN
CARBON DIOXIDE
SUGARS

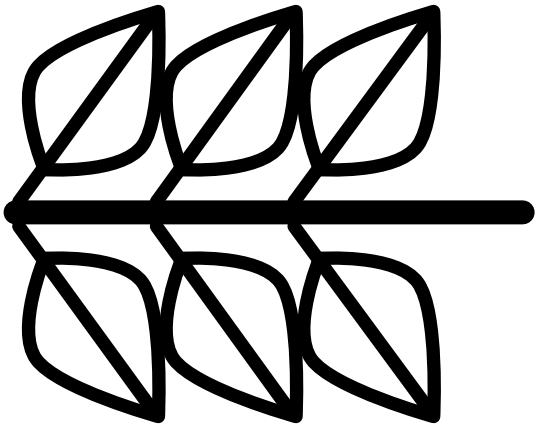
PHOTOSYNTHESIS

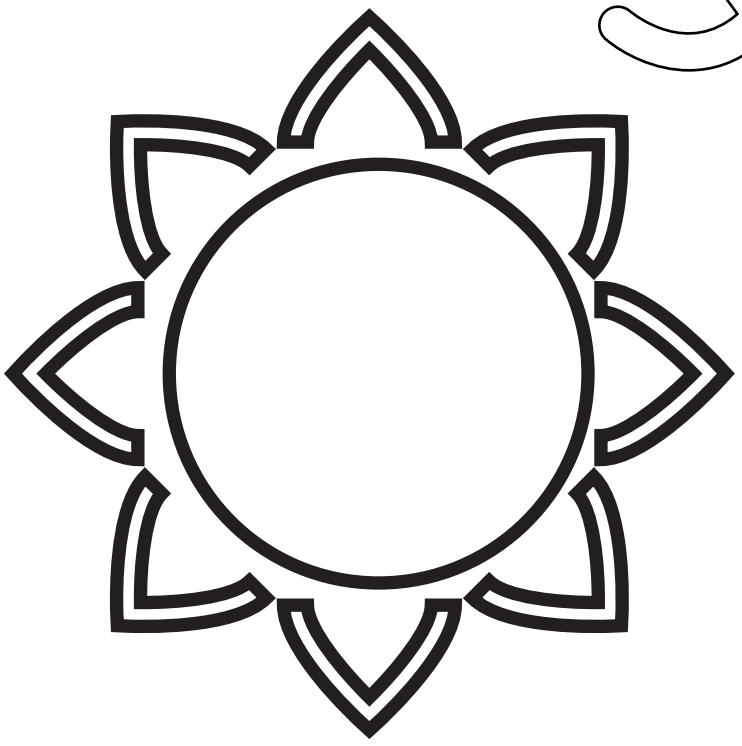












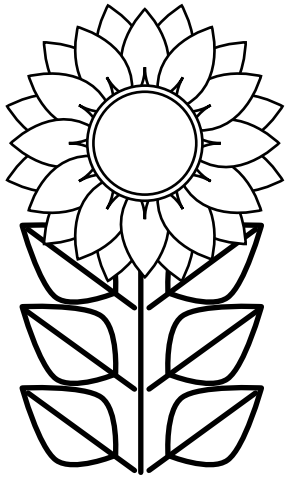
SUGARS

CARBON DIOXIDE

OXYGEN

Photosynthesis Observations

Use this worksheet to process and evaluate your work.



What does ‘photosynthesis’ mean?

What four things do plants need to live?

What two things do plants produce?

What is the green pigment that gives plants their color?