

USAGSO Paris Science In Action Patch Requirements



Patch requirements designed by a USAGSO Paris Girl Scout for her Gold Award.



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Welcome!

According to the UNESCO website, “Basic sciences - chemistry, physics, mathematics, and biology – allow us to understand natural phenomena and drive innovation” ([UNESCO-Russia Mendeleev International Prize in the Basic Sciences](#)). All modern technologies are rooted in these fundamental sciences. In other words, without basic science, we would not have the advances and tools that shape our everyday lives (including cell phones, TV, cars, etc.).

This guide is designed to help you and your troop discover the basic sciences by working towards earning the USAGSO Paris Basic Science Patch, a badge created as part of my Gold Award project.

The goal of this patch is to make the basic sciences more fun, engaging, and accessible for scouts of all ages. Through a variety of hands-on activities, scouts will explore the different basic sciences and build their scientific curiosity and skills.

How the Patch Works:

The patch requirements have been designed by level: (1) Daises and Brownies and (2) Juniors to Ambassadors. Scouts should complete requirements in their level.

To earn the patch, each scout (irrespective of their level) must complete two activities in the Introduction to Basic Science and one in each of the four subsequent science categories:

1. Math
2. Physics
3. Chemistry
4. Biology

Each category includes three activity options, so you and your troop can choose what interests you the most.

Thank you for being part of this journey! Happy discovery!



Adult Volunteer Guide:

DAISIES & BROWNIES (ages 5-9)

Introduction to basic science

This first activity is designed to introduce your scouts to the world of basic sciences, in a fun, engaging, and hands-on way.

Step 1: Required Activity

Did you know that since the creation of the Eiffel tower in 1889, it has honored 72 male French scientists? Gustave Eiffel had their names engraved in gold letters on the tower's first level. However, Gustave Eiffel did not honor a single women's contribution to science. It was a different era, and things have changed in the twenty-first century.

France has a rich history of women contributing to the advancements of science. Of course, one cannot overlook Marie Skłodowska-Curie, the only scientist (male or female) to ever win the Nobel prize in two scientific disciplines: Physics and Chemistry. But she is far from the only female scientist!

To honor women in science, 72 women scientists will have their names added to the tower's first level.

The first requirement is to learn about two women scientists who will have their names added to the Eiffel tower. You can find the list revealed by the Paris mayor on January 26, 2026 ([at the end of this document](#)).

Step 2: Choose One Activity

- Visit a science museum or attend a science event: Visiting a science museum or going to a science event is a great way to explore interactive exhibits and learn about famous scientists and discoveries. Some recommended options around Paris include:
 - Musée Curie ([Musée Curie - Site officiel • Situé à Paris dans le 5e arrondissement - Musée Curie](#))
 - Cité des enfants ([La Cité des enfants - Expos permanentes - Au programme - Cité des sciences et de l'industrie](#))
 - Cité des Sciences et de l'Industrie ([Cité des sciences et de l'industrie - Accueil - Expositions, conférences, cinémas, activités culturelles et sorties touristiques pour les enfants, les parents, les familles - Paris](#))
 - Fête de la science ([Page d'accueil | Fête de la science](#))
 - Other science events for kids, including start-up for kids
- Meet a scientist: Talking to a real scientist can be an inspiring experience. Scouts can ask questions about what they do, what inspired them, and what their daily work looks like.
- Discover basic science and the different scientists with the [coloring book](#) I designed: If your scouts are young (5-6), this option is a great fun way to introduce the basic sciences. Note: You will find Rosalind FRANKLIN, who's name will be potentially added to the Eiffel Tower. She worked in France from 1947-1950 and learned about X-ray diffraction, which enabled her to produce images of DNA by X-ray.

USAGSO-PARIS is a registered nonprofit organization. (Reg. 434100183768) Girl Scouting builds girls of courage, confidence, and character, who make the world a better place.

Mathematics (Choose One Activity)

M&M probability

If you were to open a bag of Plain M&M's, what color would you most likely get? What color would you least likely get? Whenever you start to use the words "most likely" or "least likely," you are talking about probability.

In this activity, scouts will dive into the world of probability using M&Ms! By counting, sorting, and drawing candies from a bag, you'll learn how likely it is to get certain colors. Keep in mind this experiment might be challenging for Daisies.

Prep-work:

- Prepare sets (can be put in bags, cups, whatever is easiest for the AV) of 10 M&Ms per scout. Colors should be random (i.e. each scout will not have the same M&M colors). You can also buy small individual bags of M&M or other candies like the European Smarties (however you will have to change the colors on the worksheet).
- Print 1 M&M worksheet per scout plus 1 extra for the total count.

Activity:

1. Make a hypothesis!
 - Each scout should predict what color is the most common in a bag of M&Ms.
 - Each scout should predict what color is the least common in a bag of M&Ms.
2. Give each scout a set of 10 M&Ms and the M&M worksheet.
3. Have each scout count and record the number of M&Ms on the worksheet.
4. Now tell the scouts: *The small bags of M&Ms come from a big bag M&Ms. Now we are going to combine our results to see which M&Ms color is the most popular in our bag and which color is the least popular.*
5. The AV should record the combined results on the extra worksheet or a blackboard.
6. Write down the probability!

$$\text{Probability} = \frac{\text{Total of M\&Ms of a certain color}}{\text{Total number of M\&Ms overall}}$$

Example: If there are 5 red M&Ms overall and 40 M&Ms in total the probability to pick red is $5/40$ or $1/8$.

7. Ask each scout these following questions:
 - Which color M&M is the most common?
 - Which color M&M is the least common?
 - Tell the scouts: *The most common color is the most likely color to be picked randomly, and the least common color is the least likely color to be picked randomly.*
 - Ask the scouts if their hypothesis was correct or not.



M&M worksheet

Make a hypothesis! A hypothesis is a guess.

- What color is the most common in a bag of M&Ms _____
- What color is the least common in a bag of M&Ms _____

Color	Total of M&M's in your bag	Total of M&M's overall	Probability
Red			
Yellow			
Blue			
Green			
Brown			
Orange			

Conclusion:

- The most common color overall is _____
- The least common color overall is _____
- Is this what you expected?

2D to 3D Geometry

Have you ever wondered how 3D shapes are built? With this activity you will be able to build simple 3D shapes out of 2D shapes.

This activity will help your scouts with their perception of space. Keep in mind this experiment might be challenging for daisies.

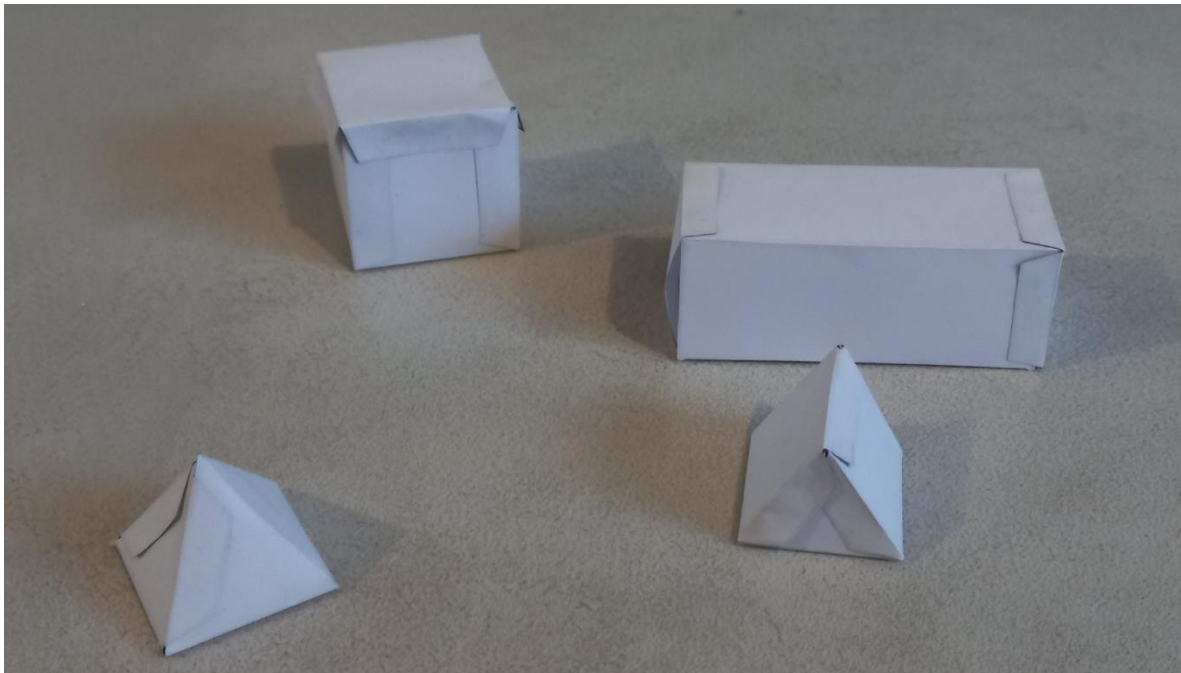
Pre-work:

- Gather supplies needed, 1 per scout
 - 2D precut patterns to create 3D shapes (The grey parts are used to glue the shape together)
 - glue sticks

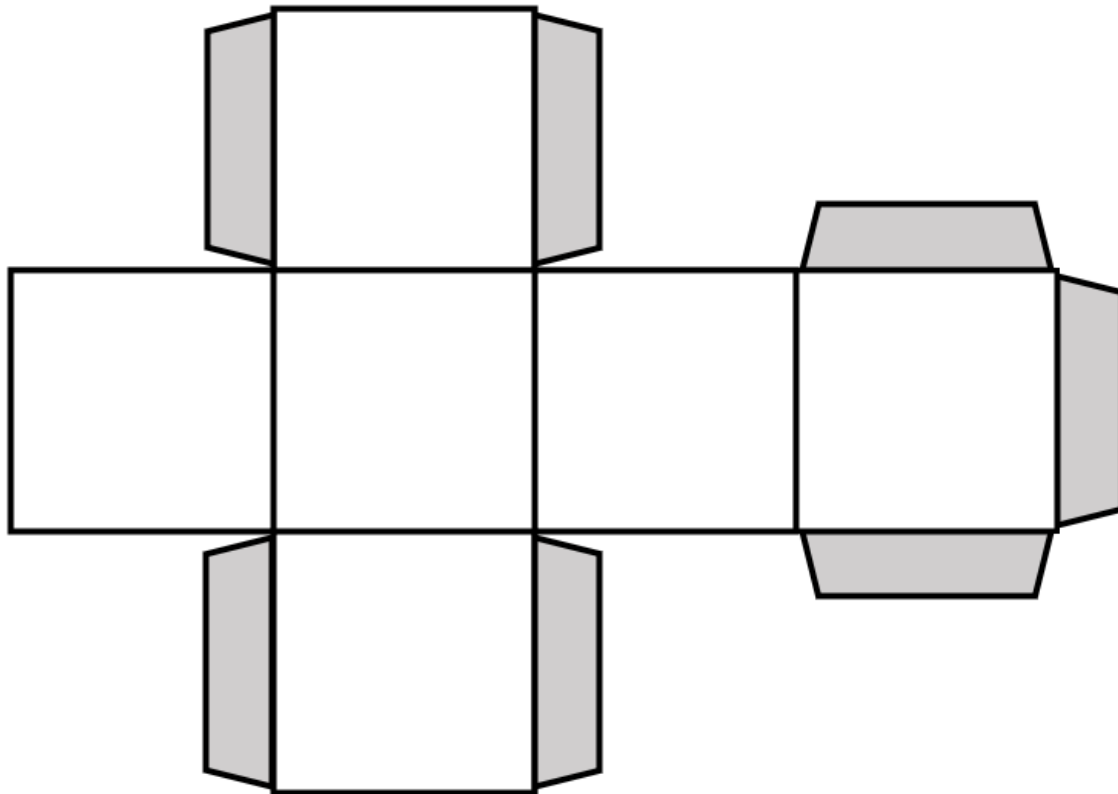
Activity:

1. Give each scout a set of the 2D precut images.
2. Let them create the 3D shape by folding the pattern on the black lines (don't forget to fold the grey parts in)
3. Have the scouts glue the shapes together using the grey parts.
4. Once the shapes are completed try to find the 3D shapes in your surroundings.

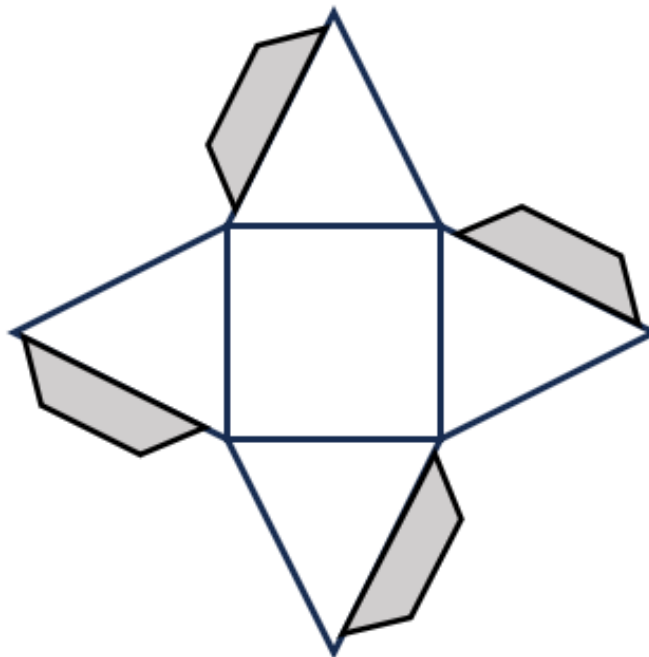
☺ If you are feeling creative you can use these shapes to create something special.



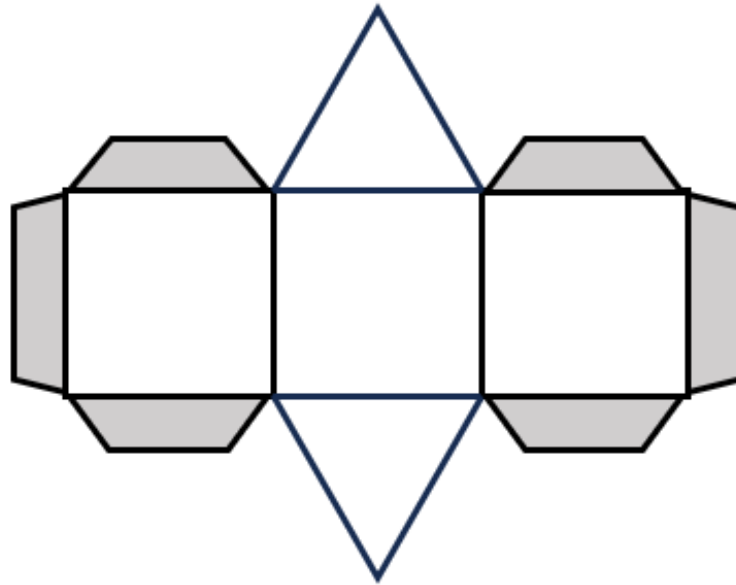
These 6 squares create a cube. For example, an ice cube is a cube. Once the shape is completed try to find a cube in your surroundings.



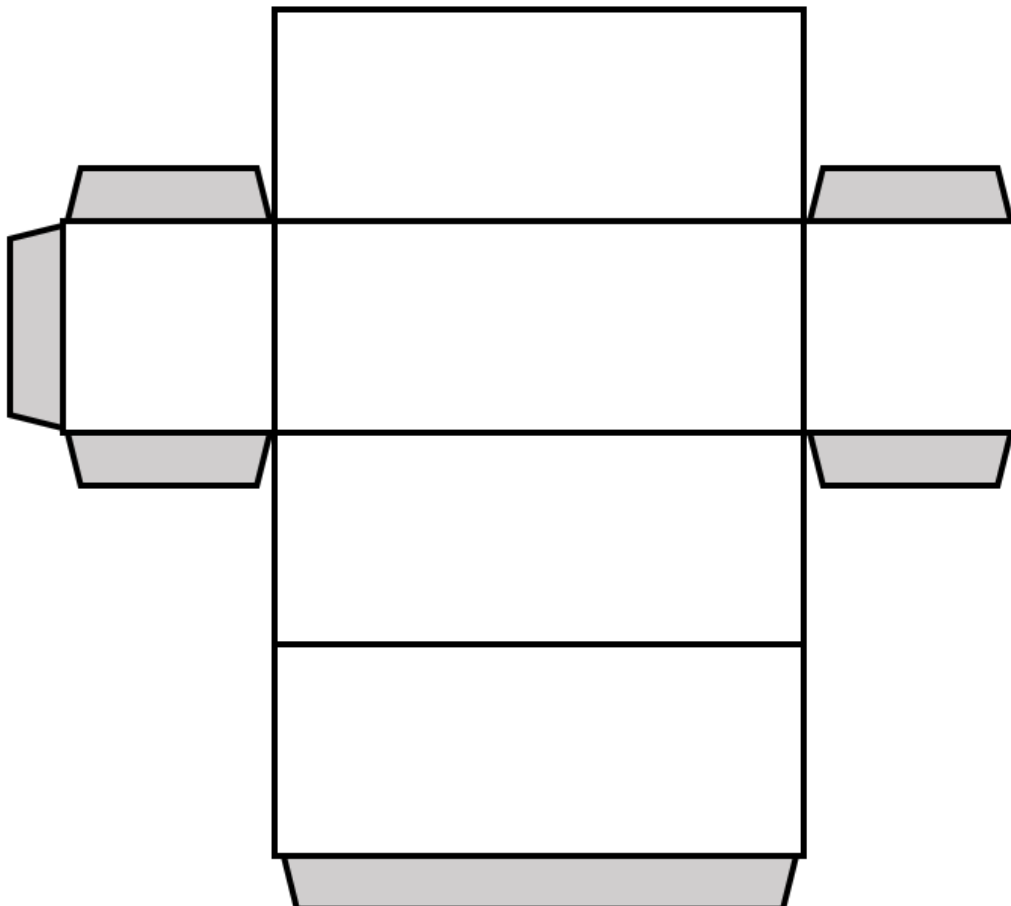
These 4 triangles and one square create a pyramid. This shape is named after the pyramids in Egypt who have a similar shape. Once the shape is completed try to find a pyramid in your surroundings.



These 2 triangles and 3 squares create a prism. For example, the roof of a house could be a prism. Once the shape is completed try to find a prism in your surroundings.



These 4 rectangles and 2 squares create a parallelepiped. This shape can be found everywhere. Once the shape is completed try to find parallelepipeds in your surroundings.





Making wholes with fractions

Have you ever wondered how many $\frac{1}{3}$ cups fit into a whole cup? When we cook, we use different units of measurement, which can sometimes be tricky, especially for young children!

This activity will help Scouts visualize and understand these different units in a fun and hands-on way

Pre-work:

- Gather supplies needed

- Sets of plastic or stainless-steel measuring cups and spoons
- Glass measuring cup with various volume markings.
- Water

Activity:

1. The scouts select two measuring volumes.
2. The leader asks the scouts how many of the smaller volume fits into the larger volume.
3. Then test with water.
4. Ask the scouts if they guess correctly?
5. Repeat at least 3 times for different measuring volumes.

Example 1:

- The AV selects a 1 cup stainless-steel measuring cup and a 1 cup glass measuring cup.
- The AV asks the scouts: *How many of the 1 cup measuring spoons will it take to reach the 1 cup mark on the glass measuring cup.*
- Do the test.
- Did the scouts guess correctly?
- In this instance, the volumes should be equivalent.

Example 2:

- The AV selects the 1 teaspoon and 1 tablespoon.
- The AV asks the scouts: *How many of teaspoons make up a tablespoon.*
- Do the test.
- Did the scouts guess correctly?
- In this instance, 3 teaspoons = 1 tablespoons.

Example 3:

- The AV selects the 1 cup and $\frac{1}{4}$ cup.
- The AV asks the scouts: *How many of the $\frac{1}{4}$ cup measuring spoons will it take to reach the 1 cup mark on the glass measuring cup.*
- Do the test.
- Did the scouts guess correctly?
- In this instance, four $\frac{1}{4}$ cups = 1 cup.

Physics (Choose One Activity)

Reference Frame

Have you ever noticed how a ball can look like it's moving in different ways depending on where you're standing?

In this activity, Scouts will explore the concept of reference frames by throwing a ball at different angles and observing how its path changes. Get ready to see the world from a whole new perspective!

Reference frames is a point of view from which you are measuring things. If you need more explanations, you can watch these videos:

- <https://www.youtube.com/watch?v=3yaZ7IkQPUQ>
- <https://youtu.be/wD7C4V9smG4>
- https://youtu.be/mYH_nODWkqk

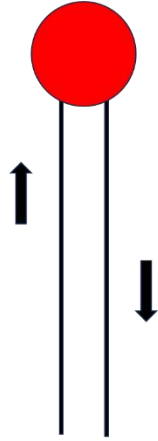
The concept of a reference frame can be difficult to comprehend at first. This notion can be introduced in a simple way with this easy activity.

Pre-work:

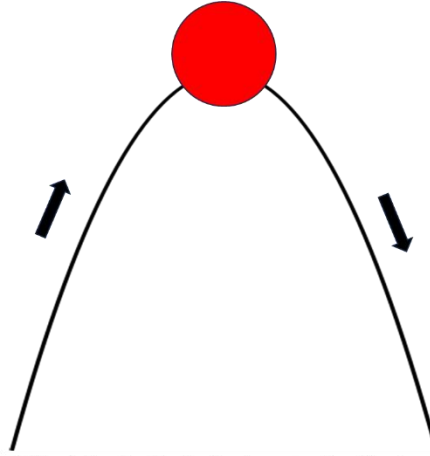
- Watch the videos above by yourself. Select one or two to show your troop.
- Gather supplies
 - 1 ball per team plus one for the AV

Activity:

1. Watch the preselected video on reference frame.
2. The AV begins by tossing a ball straight up into the air while facing your group of scouts.
3. She asks the scouts what they saw. Typical answer: The scouts will say the ball went up and down.
4. Repeat the same action while walking (facing sideways) at a constant velocity.
5. She asks the scouts what they saw. Typical answer: While the ball will continue to move up and down in your perspective, your group of children will see it moving in a more parabolic way (see figures below).
6. Finally, ask your scouts to pair up so they can see it for themselves.



What the ball's trajectory looks like to the person moving



What the ball's trajectory looks like to the observer

The colors of light

Have you ever noticed how colors can change depending on the light source!

In this activity, scouts will play with red, green, and blue lights to discover how colors change depending on the light source. Will a yellow toy still look yellow under a blue light? Let's experiment and find out!

Pre-work:

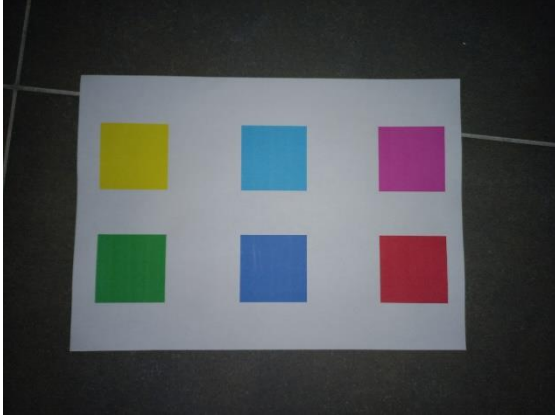
- Gather supplies needed:

- Flashlight or phone
- Plastic film for cooking (or red, blue and green colored filters if you have them)
- Red, blue and green colored markers (preferably sharpies)
- Colored objects or print out my color sheet

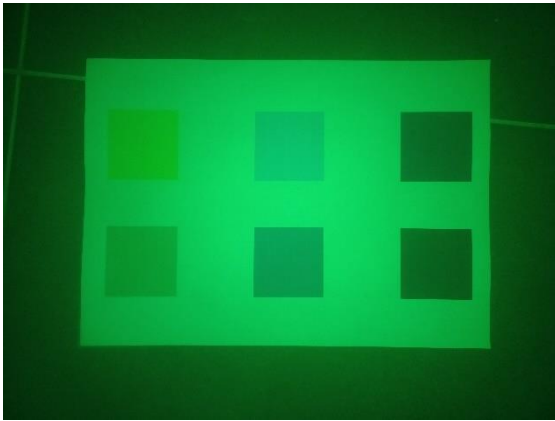
Activity:

1. Color the plastic film, using the markers, making red, blue and green circles larger than your flashlight or the flash on your phone. If you already have colored filters no need for this step.
2. Put the plastic filter on the lamps in a dark room. The light should appear the color of the filter.
3. Before placing the colored markers or colored objects in front of the light ask your scouts what they think will happen for each filter. Will each color of the rainbow appear black? Will each color of the rainbow maintain their original color? Will all the colors turn the color of the filters? Will some colors turn black?...
4. Put the colored objects in front of the lamp and filter. What do you see?
 - If all goes well, with the red filter the colors green, cyan blue should turn black, the color red should stay red, the colors orange and yellow should turn red as orange and yellow are a mix of red and green and there is no green in the light and finally the color purple should also turn red as there is no blue in the light to make purple.
 - With the green, filter the colors blue, purple and red should turn black, the color green should stay green, the colors yellow and orange should turn green as orange and yellow are a mix of red and green and there is no red in the light and finally the color cyan should also turn green as there is no blue in the light to make cyan.
 - With the blue, filter the colors green, yellow, orange and red should turn black, blue should stay blue and the colors cyan and purple should turn blue as cyan and purple are a mix of blue and green and red and blue and there is no red or green in the light.
5. Explain to your scouts that white light is composed of all colors. There are three primary colors of light: red, blue and green. Red and blue make magenta (purple), green and red make yellow, and blue and green make cyan. When you put a red, blue or green filter on the top of a white light all other colors are absorbed except for the color of the filter.

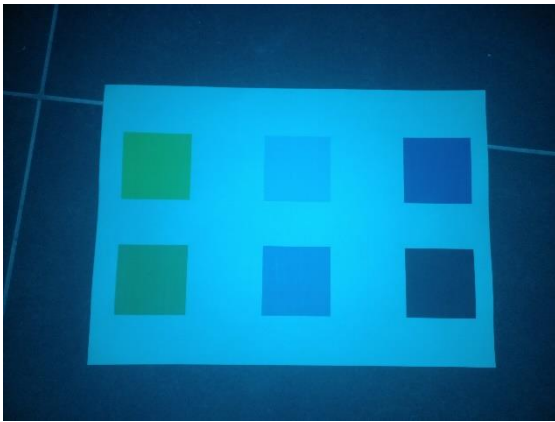
Keep in mind that this is an experiment, it will depend on the exact pigments of your filters, the darkness of your room, etc.



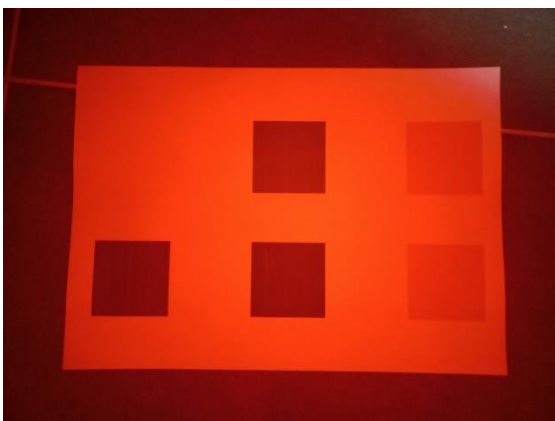
Colors with white light



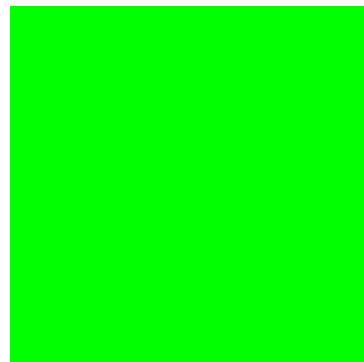
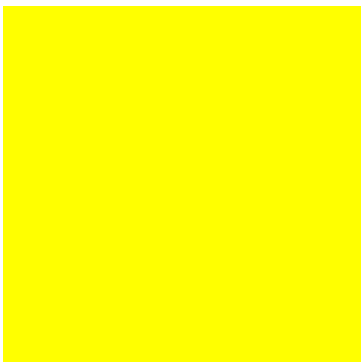
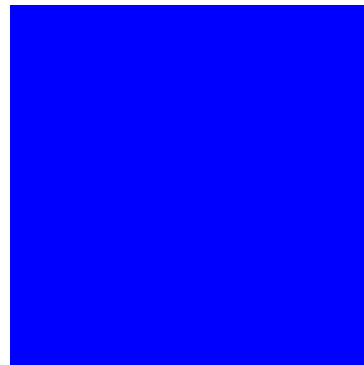
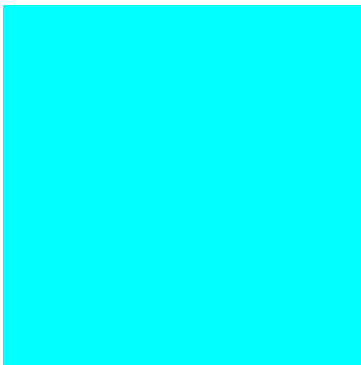
Colors with green light



Colors with blue light



Colors with red light



Density in a jar

What if I told you that you can create your very own liquid rainbow?

In this activity, Scouts will discover the science of density by layering different liquids in a jar. Watch closely as some liquids float on top, while others sink below. It's a colorful experiment that shows how science can be both fun and beautiful!

Pre-work:

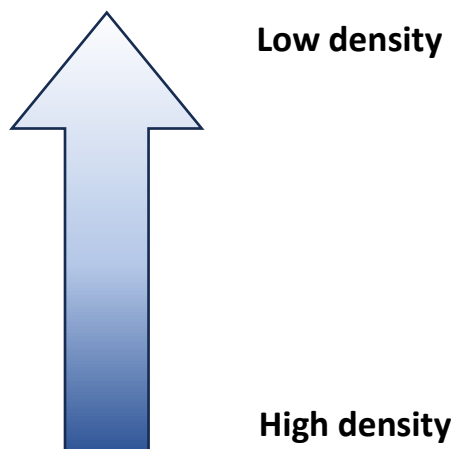
- Gather supplies needed
 - Glass container
 - Water
 - Dish soap
 - Oil
 - Food coloring (optional)

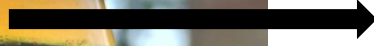
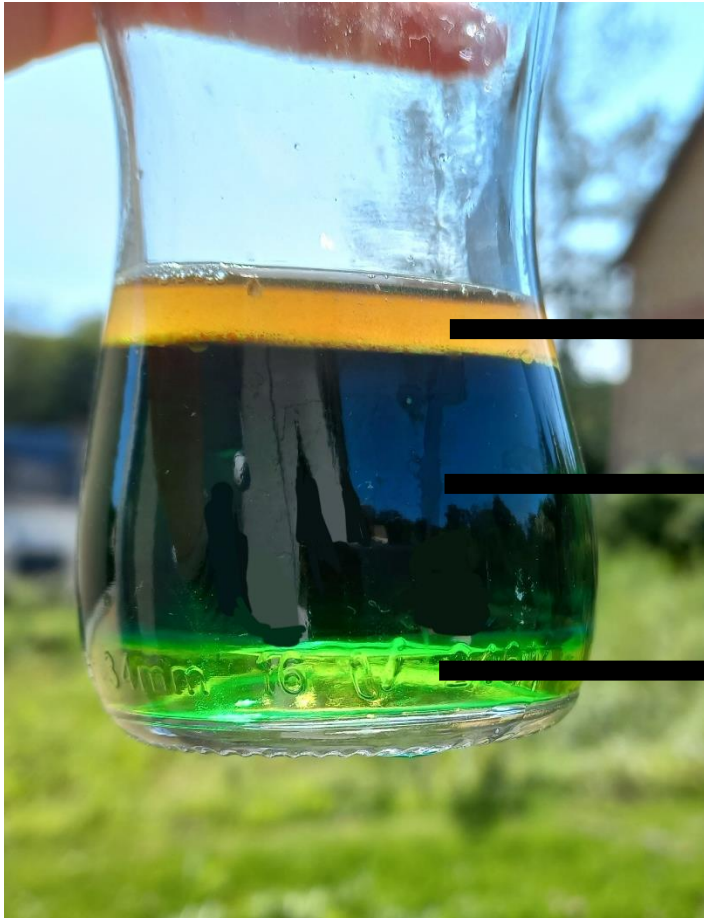
Activity:

1. Show to your scouts the three different liquids (water, oil and dish soap) and ask them these questions: Do you think the liquids will mix? Do you think they will separate? Which one's will sink? Which one's will float?
2. Pour dish soap in a glass container. You may opt for a colorful one so you may see the different liquids better.
3. Pour gently water in the glass container. You may use food coloring to see the different liquids better.
4. Finally pour gently the oil in. You should see the three different liquids stay on top of one another.
5. Discuss the result. Explain that liquids have different densities this is why they sit on top of one another.

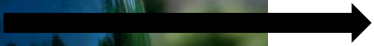
PS: if you want to use more liquids you can. Here is a chart of different liquids you may find around your house. The liquids with the highest densities should be poured first. Beware the more liquids you pour the gentler you must be.

Liquids
Alcohol
Virgin oil
Water
Dish soap
Whole milk
Corn syrup or Maple Syrup
Honey

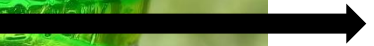




Oil



Water with dye



Dish soap

Chemistry (Choose One Activity)

M&Ms in water, alcohol and oil

M&Ms are great but have you ever noticed that if your fingers are a little wet, the candy coating begins to dissolve and you see the color on your fingers? If the coating dissolves in water, do you think it will dissolve in other liquids?

In this activity, scouts will experiment with water, oil, and alcohol to see how each liquid affects the candy's color and coating.

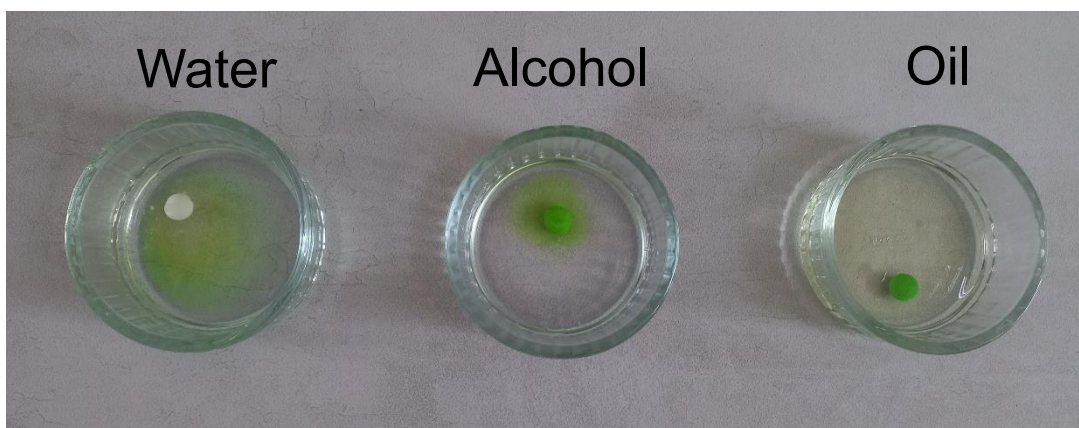
Pre-work:

- Gather the supplies needed:

- M&Ms
- 3 plastic cups labeled: water, alcohol, and oil
- Water, alcohol, and oil
- A tablespoon

Activity:

1. Before starting the experiment, ask your troop if they think the M&M will dissolve the same way in each liquid. If not, which liquid do they think will dissolve the M&M the more?
2. Add 1 tablespoon of water, isopropyl alcohol, and oil to its labeled cup.
3. Take three M&Ms of the same color and put one in each cup.
4. Swirl each cup for about 20 seconds to see if one liquid is better than another at dissolving the candy coating.
5. Explain to your troop what a variance is. A variance in chemistry is a change in material, environment or procedure that will affect the results. Indeed, if you change the liquid in which the M&M is dissolved in, the results change.



Molecular Modeling with Gummies

Ready to turn gummy candy into science?

In this activity, scouts will use gummies to build their very own molecular models! It's like playing with candy Legos—connecting gummies to create shapes and structures that represent real-life molecules!

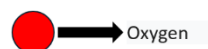
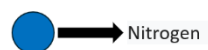
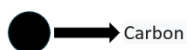
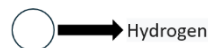
Pre-work:

- Gather supplies needed:

- Toothpicks
- Soft, circular jellied candies of a variety of colors (The colors you need will be listed in the color chart down below). You will need white or clear gummies which can be hard to find. A good substitute is small marshmallows.
- A large bowl or Ziploc bags to contain the *candy atoms*.
- Index cards with molecules

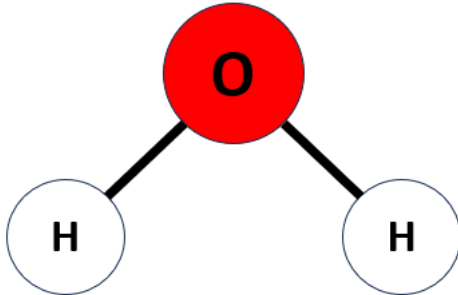
Activity:

1. Place all the jellied candies in a large bowl or Ziploc bags. You may opt to separate the candies by color, but it is not necessary.
2. Place the toothpicks on the table for easy access.
3. Before starting the activity explain to your troop what atoms are in a simple way. For example, tell them that atoms are tiny particles that connect to each other, creating molecules which are also tiny. Everything around them is made of atoms connected to each other. Tell them that the gummies represent atoms and that by connecting these gummies together in a specific way they will be creating a model of a molecule.
4. Tell your scouts what the five molecules in the index cards represents in a simple way:
 - H_2O is water. You need this molecule every day to survive.
 - CH_4 (methane) is the main component of natural gas. It is found in flatulence.
 - NH_3 (ammonia) is often used in agriculture as it is a fertilizer.
 - H_2O_2 (hydrogen peroxide) can be used in medicine to disinfect a minor wound.
 - CH_3CL (chloromethane) was once widely used as a refrigerant and now has a wide range of current industrial applications.
5. Divide your scouts into smaller groups and give each group a molecule to build.
6. Use the index cards down below as a model to build the molecules. The designated color of each atom must be respected.

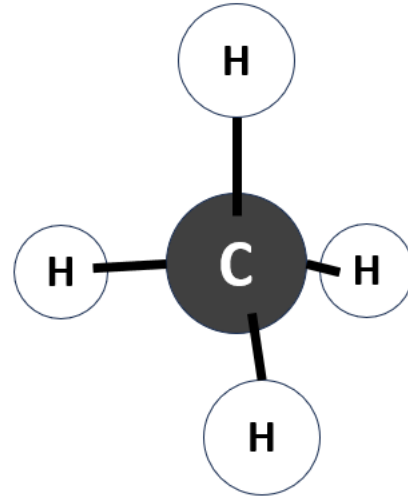


Index cards:

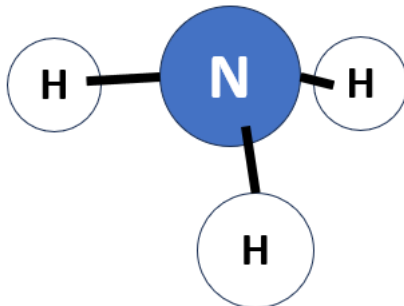
Water or H₂O



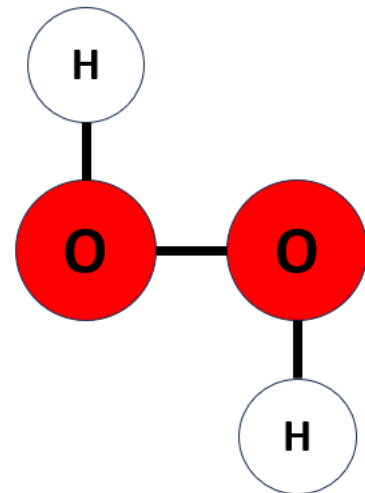
Methane or CH₄



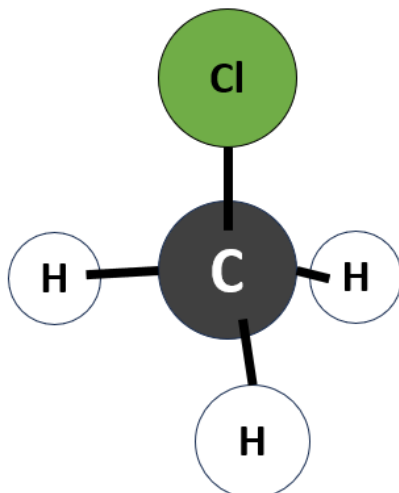
Ammonia or NH₃

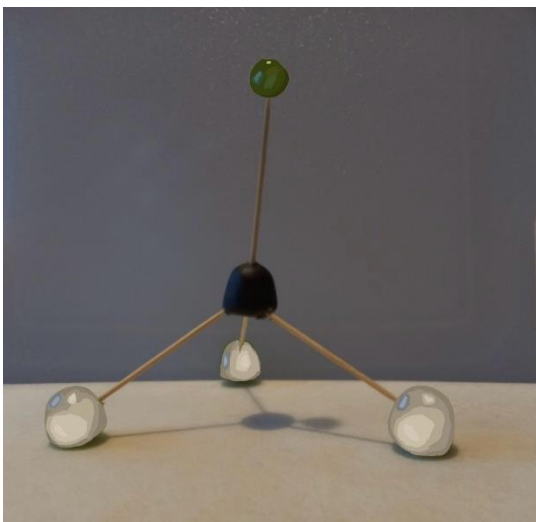
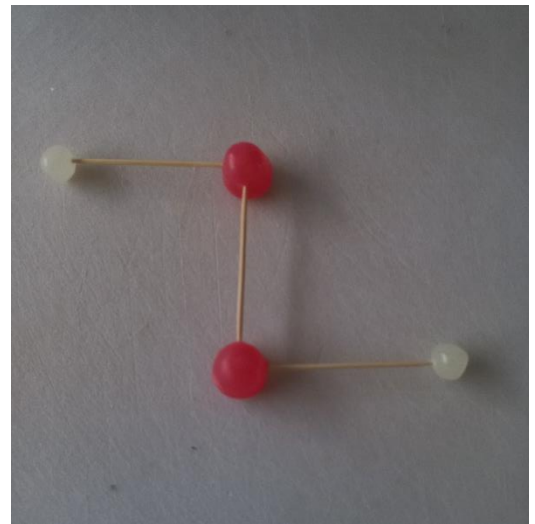
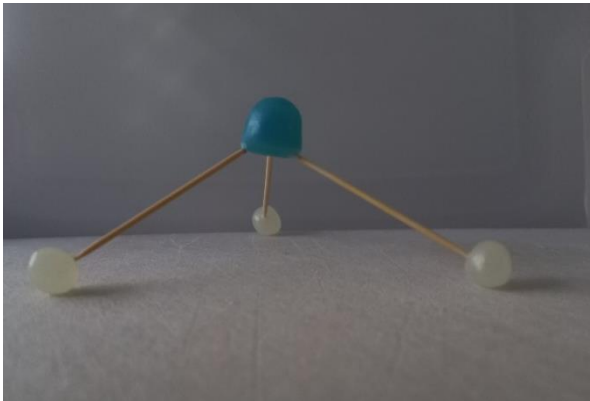
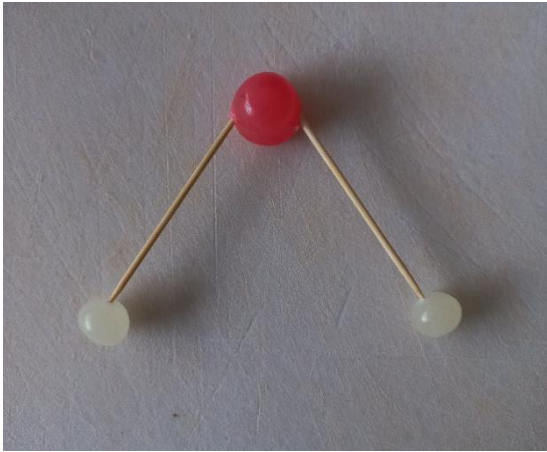


Hydrogen peroxide or H₂O₂



Chloromethane or CH₃Cl





Yeast and gas

Have you ever wondered why bread is filled with bubbles?

In this activity, scouts will explore the power of yeast as it reacts with sugar to create gas, enough to inflate a balloon!

Pre-work:

- Gather supplies needed:

- Yeast packet from your local grocery store
- Sugar
- Water
- A hot water kettle
- A glass or plastic empty bottle
- A balloon
- A funnel

Activity:

1. Blow up the balloon a few times to stretch it out.
2. Fill the bottle up with about one inch of warm water using the funnel. It is best to heat the water between 105°F and 115°F, when the water is cold the microorganisms are resting and if the water is too hot, they will die.
3. Add all the yeast packet using the funnel to the bottle and gently swirl the bottle for a few seconds.
4. Add about a teaspoon of sugar using the funnel and swirl around some more.
5. Place the balloon over the neck of the bottle.
6. Let the bottle sit in a warm place for about 20 minutes. During this time ask the scouts if they think the balloon will inflate. If all goes well the balloon will begin to inflate.
7. Tell your scouts, when heated the yeast reacts with the sugar and forms a gas (in this case CO₂). The gas inflates the balloon. In bread, this is what causes bubbles.



Biology (Choose One Activity)

Taking your pulse

Have you ever wondered how your heart speeds up when you run around?

In this activity, Scouts will learn how to take their pulse and see how fast their heart is pumping after different activities. By feeling the rhythm of your heart, you'll get to see how exercise or even just sitting still can affect how your body works.

Pre-work:

- Gather supplies needed:

- Stopwatch or timer on a cell phone

Activity:

1. Before starting the activity tell the scouts that their bodies change and react different ways according to where they are and what they are doing.
2. Ask your scouts to feel their pulse (neck or wrist). Then ask them to feel their neighbor's pulse too.
3. Now ask them to count the number of pluses in 20 seconds. The scouts can record this on a scrap piece of paper so they don't forget.
4. Ask them what they think will happened to their pulse after doing a physical activity.
5. Ask them to run around or do some kind of physical activity for about 5 minutes.
6. What happened? Do a survey:
 - How do they feel?
 - Is their pulse faster or slower? Count the number of pulses in 20 seconds (most scouts should answer that their pulse is faster)
 - Is this what they expected?
 - Why do you think your pulse is faster after doing physical exercises?

Answer: When you do physical activity, your muscles need more oxygen. Your heart pumps faster, increasing your pulse, so that your blood can bring more oxygen to your muscles.

This is also why you breath harder when you exercise.

The travel of water in a plant

What if you could see water travel through a plant in real time?

In this activity, scouts will use food coloring to track the journey of water and uncover the secret pathways inside the plant.

Pre-work:

- Gather supplies needed:

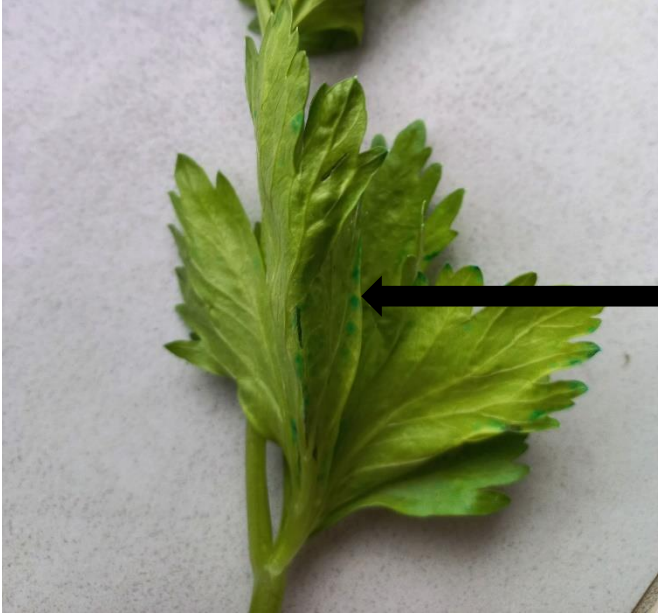
- Water
- Glass cup or vase
- Several white carnations, other white flowers, or celery stocks (I recommend using celery as it is cheaper, faster and you can observe the travel of water better through the celery's veins)
- Measuring teaspoon
- Knife
- Food coloring; blue or red are the easiest to see

- You may have a set prepared 24 to 48h in advance to discuss the results with the scouts during your meeting.

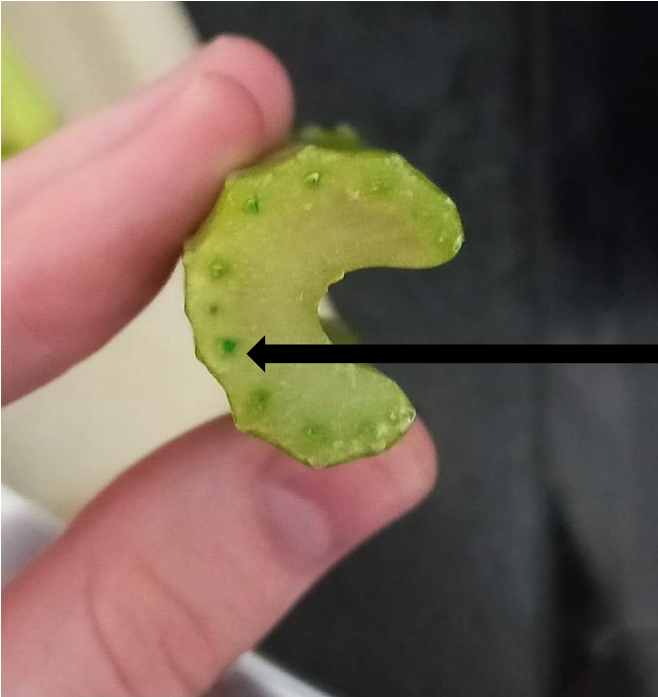
Activity:

1. Pour some water in each vase or glass cup.
2. Pour a teaspoon of food coloring in each vase or glass cup.
3. Trim the bottom of the stem at a 45° angle make sure you do this part and not your scouts. (you may also trim the bottom of the celeries)
4. Place the flowers or celeries in each vase or glass cup.
5. Ask your scouts what they think will happen. Will the water travel all the way to the petals and stain them? Will the color only stain the leaves? Will the color not stain at all?
6. If all goes well the petals and leaves should stain (the water travels all the way to the petals). However, this process may take a while. You need at least 4 hours to start seeing a result but the best is to wait 24 hours or more. If an adult prepared a set prior you may cut it during the meeting.
7. Send a picture, if possible, of the set the scouts prepared, to their parents. You can also discuss the results during the next meeting.





The blue dye is
visible on the celery



The blue dye
stained the celery's
vanes



Make something bigger

What if you could see things that are too small to spot with your eyes alone?

In this activity, scouts will use a microscope or magnifying glass to explore tiny objects up close! You'll be amazed at how much bigger and more detailed things become when you take a closer look.

Pre-work:

- Gather supplies needed:

- Plants, bugs, or others, it's up to you!
- Microscope and magnifying glass (multiple for large groups)
- Papers, pencils and coloring pens

Activity:

1. Pick out the organism that you want your scouts to analyze. If you have a large group of scouts, I recommend picking out several.
2. Ask your scouts to draw what they see with their naked eyes.
3. They will look at their organism under a magnifying glass. If you only have one, ask them to take turns.
4. Ask them to draw what they see now. Did they see more details, different patterns?
5. They will then look under the microscope (this step is not recommended for daisies as it may be too complicated).
6. Ask them to draw what they see now. Did they see more details, different patterns?

Adult Volunteer Guide:

JUNIORS TO AMBASSADORS (ages 10-18)

Introduction to basic science

This first activity is designed to introduce your scouts to the world of basic sciences in a fun, engaging, and hands-on way.

Step 1: Required Activity

Did you know that since the creation of the Eiffel tower in 1889, it has honored 72 male French scientists? Gustave Eiffel had their names engraved in gold letters on the tower's first level. However, Gustave Eiffel did not honor a single women's contribution to science. It was a different era, and things have changed in the twenty-first century.

France has a rich history of women contributing to the advancements of science. Of course, one cannot overlook Marie Skłodowska-Curie, the only scientist (male or female) to ever win the Nobel prize in two scientific disciplines: Physics and Chemistry. But she is far from the only female scientist!

To honor women in science, 72 women scientists will have their names added to the tower's first level.

The first requirement is to learn about two women scientists who will have their names added to the Eiffel tower. You can find the list revealed by the Paris mayor on January 26, 2026 ([at the end of this document](#)).

Step 2: Choose One Activity

- Give a presentation on a female scientist listed on to Eiffel Tower. Scouts will research this female scientist in teams or by themselves and create a short presentation.
- Meet a scientist: Talking to a real scientist can be an inspiring experience. Scouts can ask questions about what they do, what inspired them, and what their daily work looks like.
- Visit a science museum or attend a science event: Visiting a science museum or going to a science event is a great way to explore interactive exhibits and learn about famous scientists and discoveries. Some recommended options around Paris include:
 - Musée Curie (Musée Curie - Site officiel • Situé à Paris dans le 5e arrondissement - Musée Curie)
 - Cité des Sciences et de l'Industrie (Cité des sciences et de l'industrie - Accueil - Expositions, conférences, cinémas, activités culturelles et sorties touristiques pour les enfants, les parents, les familles - Paris)
 - Fête de la science (Page d'accueil | Fête de la science)
 - Other science events for kids (for example start-up for kids)

Mathematics (Choose One Activity)

M&M probability

If you were to open a bag of Plain M&M's, what color would you most likely get? What color would you least likely get? Whenever you start to use the words "most likely" or "least likely," you are talking about probability.

In this activity, scouts will dive into the world of probability using M&Ms! By counting, sorting, and drawing candies from a bag, you'll learn how likely it is to get certain colors.

Prep-work:

- Prepare sets (can be put in bags, cups, whatever is easiest for the AV) of 20 M&Ms per scout. Colors should be random (i.e. each scout will not have the same M&M colors). You can also buy small individual bags of M&M or other candies like the European Smarties (however you will have to change the colors on the worksheet).
- Print 1 M&M worksheet per scout plus 1 extra for the total count.

Activity:

1. Make a hypothesis!
 - Each scout should predict what color is the most common in a bag of M&Ms.
 - Each scout should predict what color is the least common in a bag of M&Ms.
2. Give each scout a set of 20 M&Ms and the M&M worksheet.
3. Have each scout count and record the number of M&Ms on the worksheet.
4. Now tell the scouts: *The small bags of M&Ms come from a big bag M&Ms. Now we are going to combine our results to see which M&Ms color is the most popular in our bag and which color is the least popular.*
5. The scouts should record the combined results on the extra worksheet or a blackboard.
6. Write down the probability!

$$\text{Probability} = \frac{\text{Total of M\&Ms of a certain color}}{\text{Total number of M\&Ms overall}}$$

Example: If there are 5 red M&Ms overall and 40 M&Ms in total the probability to pick red is 5/40 or 1/8.
7. Ask each scout these following questions:
 - Which color M&M is the most common?
 - Which color M&M is the least common?
 - Tell the scouts: *The most common color is the most likely color to be picked randomly, and the least common color is the least likely color to be picked randomly.*
 - Ask the scouts if their hypothesis was correct or not.



M&M worksheet

Make a hypothesis! A hypothesis is a guess.

- What color is the most common in a bag of M&Ms _____
- What color is the least common in a bag of M&Ms _____

Color	Total of M&M's in your bag	Total of M&M's overall	Probability
Red			
Yellow			
Blue			
Green			
Brown			
Orange			

Conclusion:

- The most common color overall is _____
- The least common color overall is _____
- Is this what you expected?

2D to 3D Geometry

Have you ever wondered how 3D shapes are built? With this activity you will be able to build simple 3D shapes out of 2D shapes.

This activity will help your scouts with their perception of space.

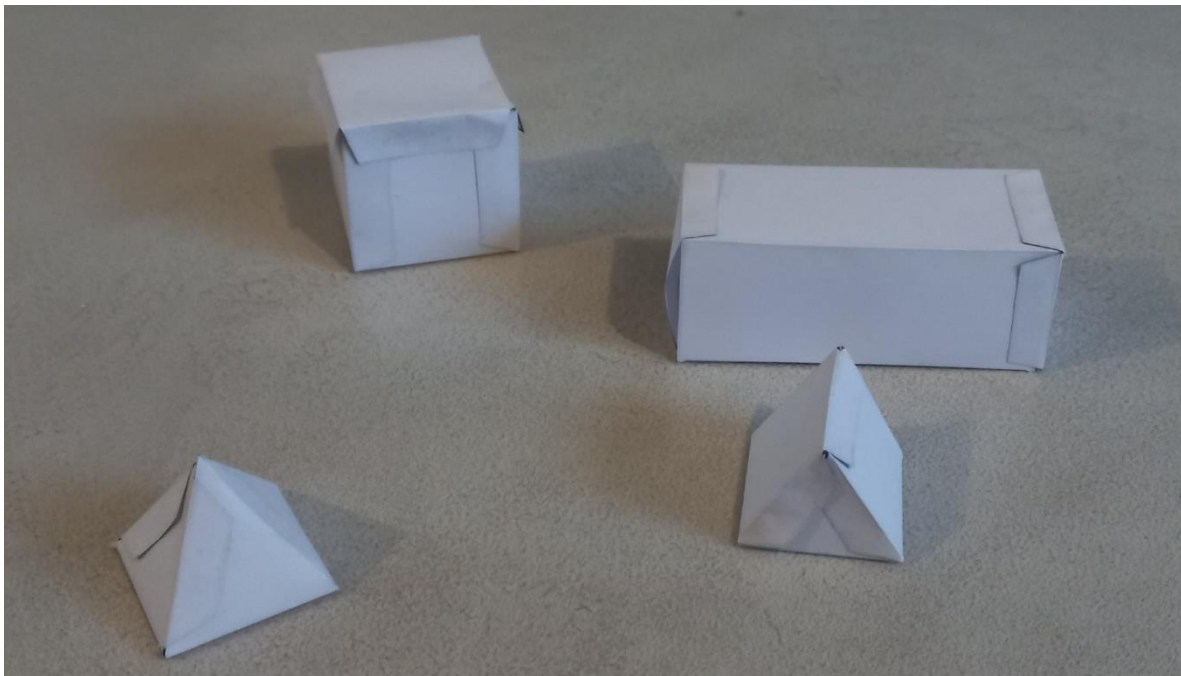
Pre-work:

- Gather supplies needed, 1 per scout
 - 2D patterns to create 3D shapes (The grey parts are used to glue the shape together)
 - glue sticks
 - scissors

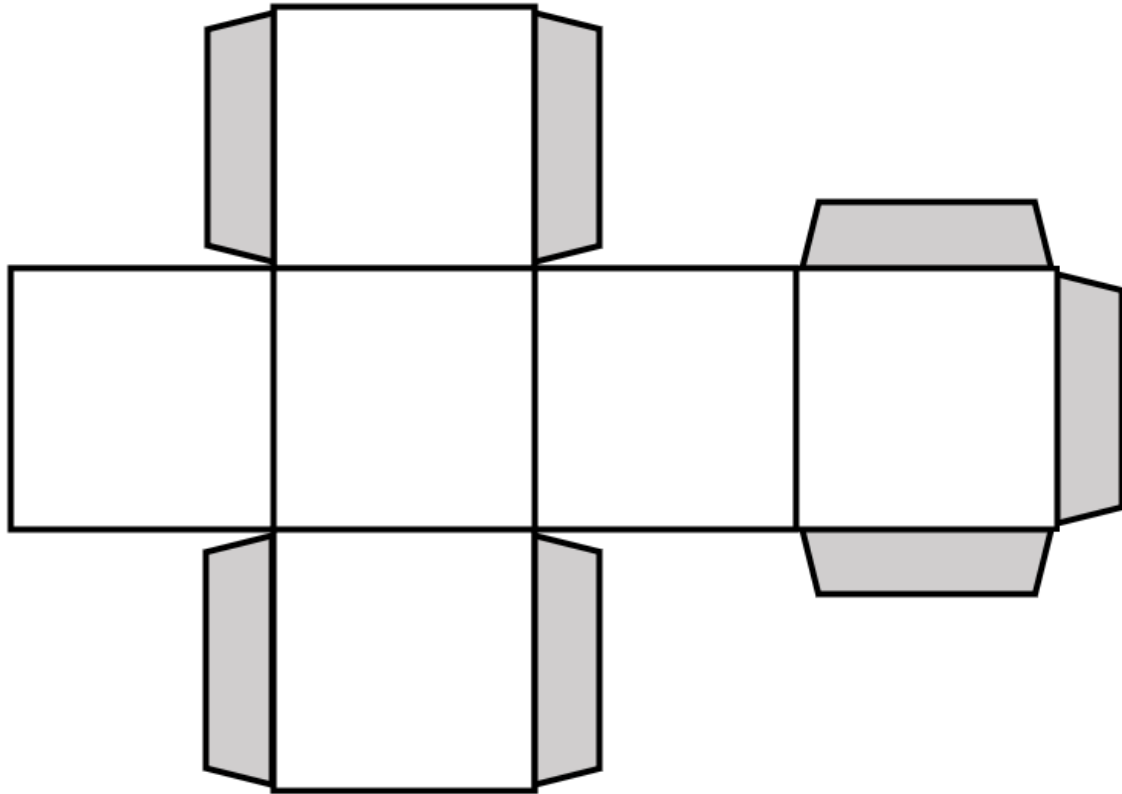
Activity:

5. If your scouts feel up to the task, they can try to draw the 2D shapes beforehand.
6. Give each scout a set of the 2D images.
7. Have the scouts cut out the shapes.
8. Let them create the 3D shape by folding the pattern on the black lines (don't forget to fold the grey parts in)
9. Have the scouts glue the shapes together using the grey parts.
10. Once the shapes are completed try to find the 3D shapes in your surroundings.

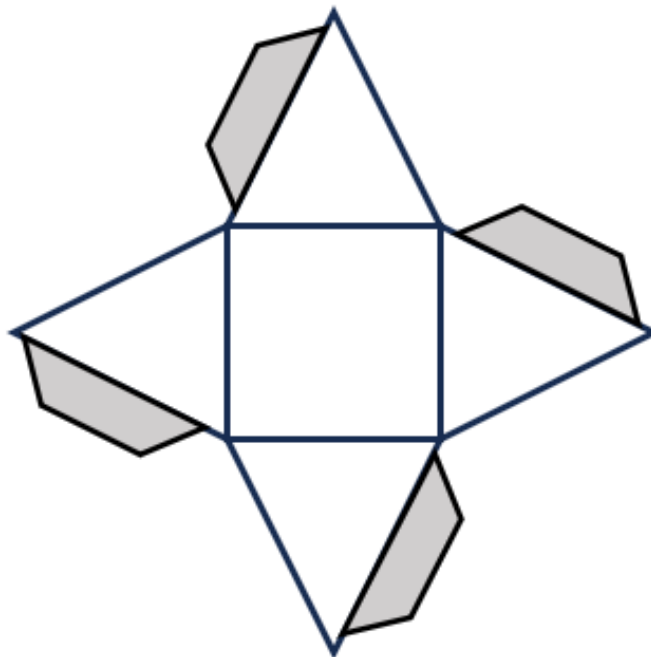
☺ If you are feeling creative you can use these shapes to create something special.



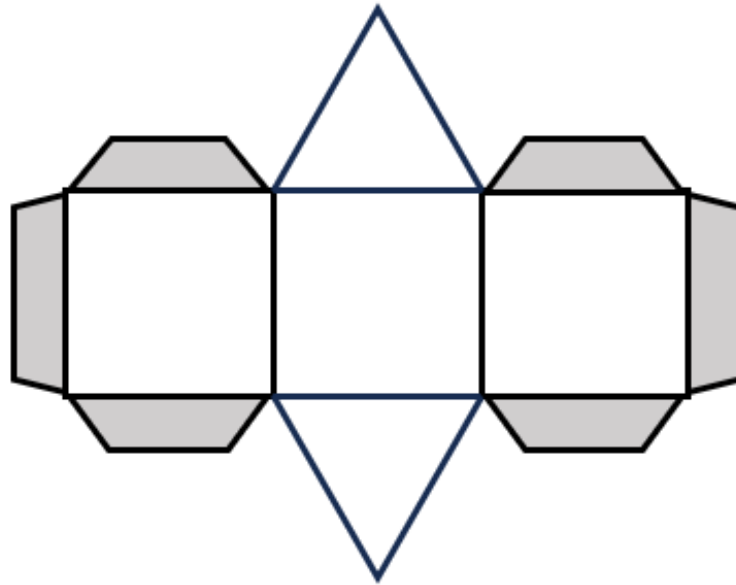
These 6 squares create a cube. For example, an ice cube is a cube. Once the shape is completed try to find a cube in your surroundings.



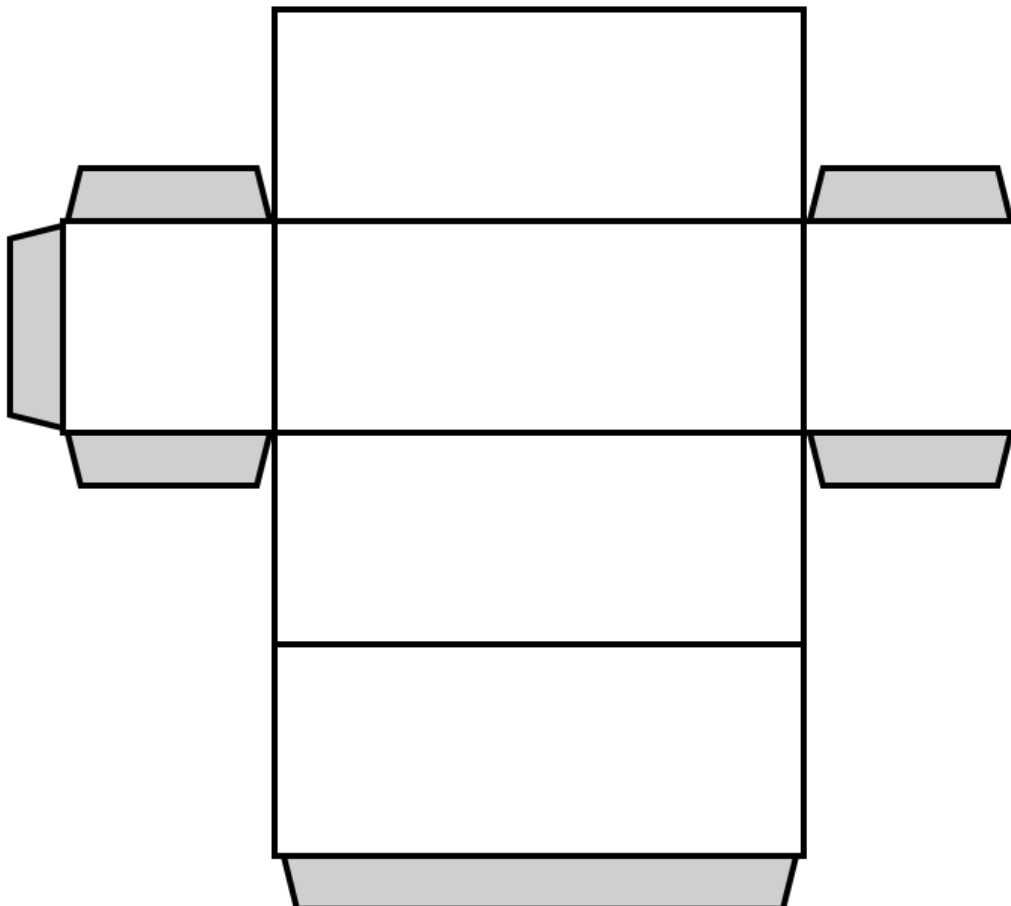
These 4 triangles and one square create a pyramid. This shape is named after the pyramids in Egypt who have a similar shape. Once the shape is completed try to find a pyramid in your surroundings.



These 2 triangles and 3 squares create a prism. For example, the roof of a house could be a prism. Once the shape is completed try to find a prism in your surroundings



These 4 rectangles and 2 squares create a parallelepiped. This shape can be found everywhere. Once the shape is completed try to find parallelepipeds in your surroundings.



Cup stacking and sequences

How can a simple stack of cups reveal a hidden pattern?

In this activity, scouts will build towers of cups and discover how they grow in a predictable way!

Pre-work:

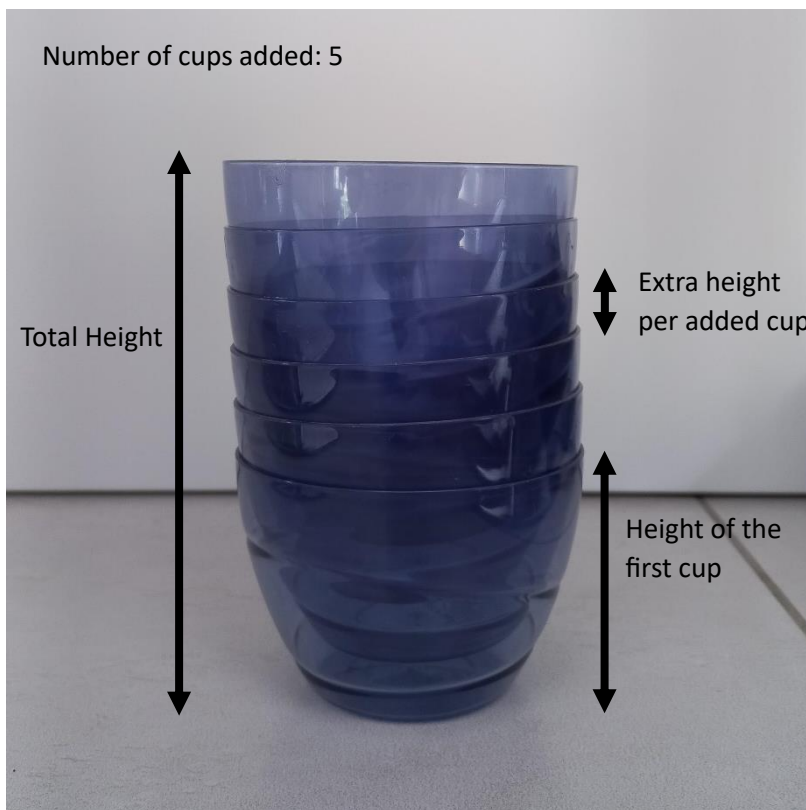
- Gather supplies needed
 - At least 5 cups identical cups
 - A ruler
 - A sheet of paper and pens

Activity:

1. Make a hypothesis. Ask your scouts: If I stack 1 cup, it's a certain height. What happens if I stack 2, 3, or more? Can we find a pattern?
2. Measure the height of one cup alone
3. Measure the height of two cups stacked on top of one another. Do the same for three cups
4. Identify the Pattern. Tell your scouts that each added cup increases the height by a fixed amount. Therefore, the total height is:

$$\text{Total Height} = (\text{Height of the first cup}) + (\text{Extra height per added cup}) \times (\text{Number of cups added})$$

5. Ask your scout what they think the height will be with 10 stacked cups.
6. Measure the height with 10 cups. Are the calculations accurate?
7. Extend the experiment: Predict the height of 50 or even 100 cups!



Physics (Choose One Activity)

The colors of light

Have you ever noticed how colors can change depending on the light source!

In this activity, scouts will play with red, green, and blue lights to discover how colors change depending on the light source. Will a yellow toy still look yellow under a blue light? Let's experiment and find out!

Pre-work:

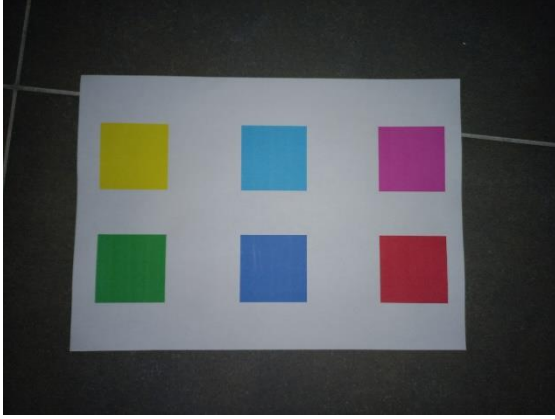
- Gather supplies needed:

- Flashlight or phone
- Plastic film for cooking (or red, blue and green colored filters if you have them)
- Red, Blue and Green colored markers (preferably sharpies)
- Colored objects or print out my color sheet

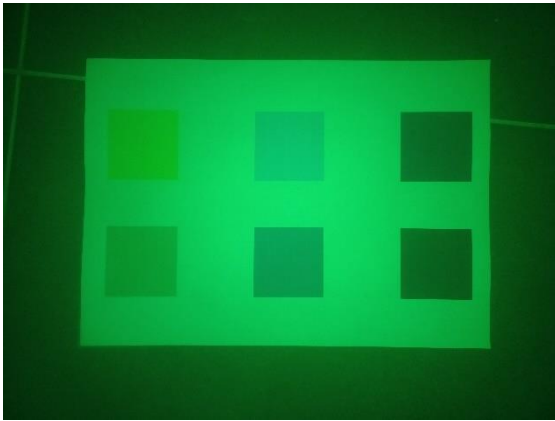
Activity:

6. Color the plastic film, using the markers, making red, blue and green circles larger than your flashlight or the flash on your phone. If you already have colored filters no need for this step.
7. Put the plastic filter on the lamps in a dark room. The light should appear the color of the filter.
8. Before placing the colored markers or colored objects in front of the light ask your scout what they think will happen for each filter. Will each color of the rainbow appear black? Will each color of the rainbow maintain their original color? Will all the colors turn the color of the filters? Will some colors turn black?...
9. Put the colored objects in front of the lamp and filter. What do you see?
 - a. If all goes well, with the red filter the colors green and cyan (blue) should turn black, the color red should stay red, the colors orange and yellow should turn red as orange and yellow are a mix of red and green and there is no green in the light and finally the color purple should also turn red as there is no blue in the light to make purple.
 - b. With the green, filter the colors blue, purple and red should turn black, the color green should stay green, the colors yellow and orange should turn green as orange and yellow are a mix of red and green and there is no red in the light and finally the color cyan should also turn green as there is no blue in the light to make cyan.
 - c. With the blue, filter the colors green, yellow, orange and red should turn black, blue should stay blue and the colors cyan and purple should turn blue as cyan and purple are a mix of blue and green and red and blue and there is no red or green in the light.
10. Explain to your scouts that white light is composed of all colors. There are three primary colors of light: red, blue and green. Red and blue make magenta (purple), green and red make yellow, and blue and green make cyan. When you put a red, blue or green filter on the top of a white light all other colors are absorbed except for the color of the filter.

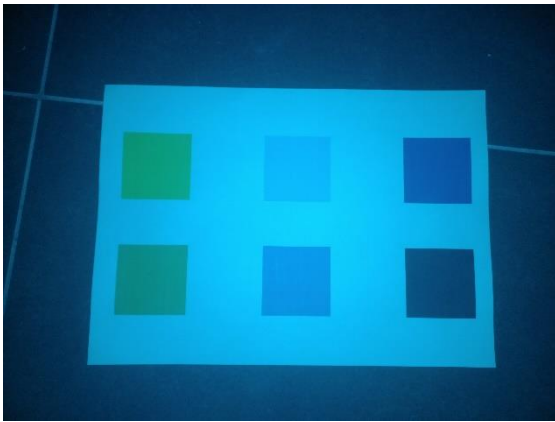
Keep in mind that this is an experiment; so therefore not 100% accurate. It will depend on the exact pigments of your filters, the darkness of your room, etc.



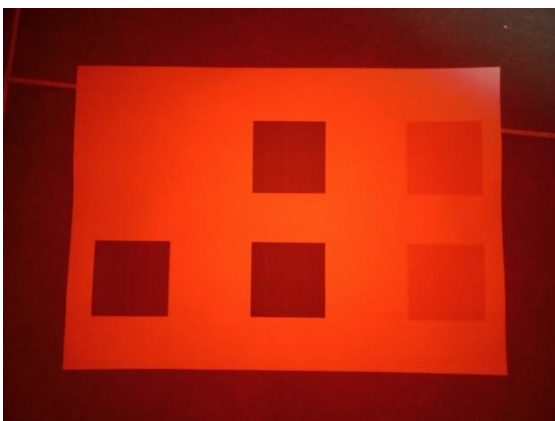
Colors with white light



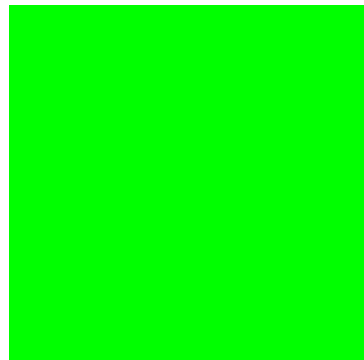
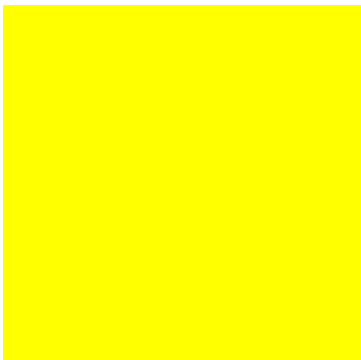
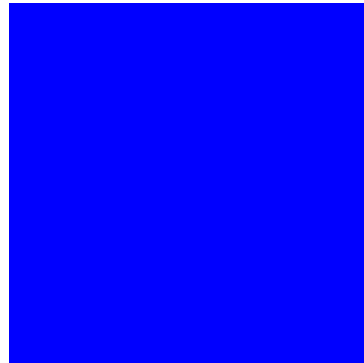
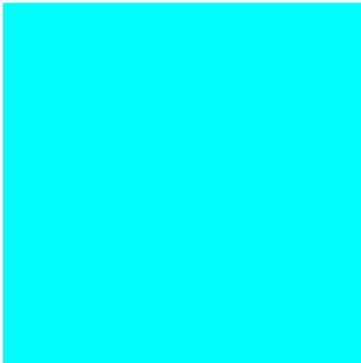
Colors with green light



Colors with blue light



Colors with red light





A Car's speed

What happens when you mix speed, distance, and time?

In this activity, scouts will race toy cars and use measurements to explore how these three are connected.

Pre-work:

- You will need a large space (a least 10 meters)
- Gather supplies needed:
 - A car toy that rolls at a constant speed
 - Measuring tape
 - A stopwatch, phone or timer
 - Paper and pens

Activity:

1. Make a hypothesis. Ask scouts: Do you think we can determine the speed of this car? If so, how? With what data
2. Choose a known distance or have scouts measure out this distance on a road or parking lot.
3. Use a stopwatch or phone timer to measure the time it takes for the car to travel the distance.
4. Calculate the speed of the car using the formula:

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

For example, if the car covers 25 meters in 8 seconds, the speed would be approximately 3 meters per second or 11 km/h.

5. Now change the distance. Do not measure it.
6. Measure the time it takes for the car to travel the new distance.
7. Calculate the distance. If your scouts are struggling, here's a reminder:

$$\text{Distance} = \text{Time} \times \text{Speed}$$

8. Play around with units and have fun!



Archimedes' principal

What makes some things float like a leaf while others sink like a rock?

In this activity, scouts will test different materials in water and calculate their density to find out why.

Pre-work:

- Gather supplies needed:

- A large transparent container (filled with water)
- A variety of objects (e.g., metal spoon, wooden block, rubber ball, coin, plastic bottle, apple, clay, etc.)
- Measuring cup or graduated cylinder
- Scale (to measure mass)
- String (for suspending objects)

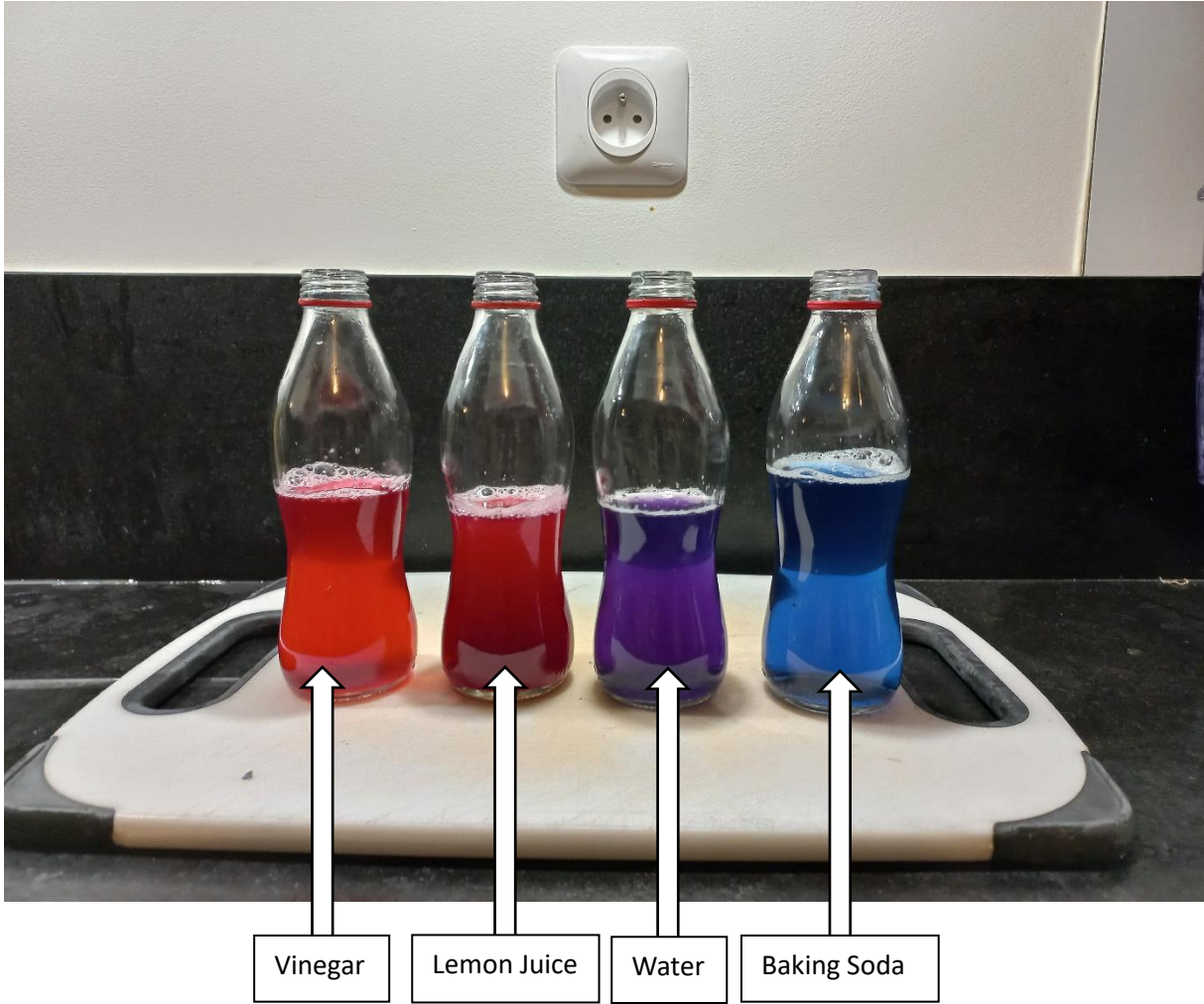
Activity:

1. Make a hypothesis. Have scouts predict whether each object will sink or float in water.
Ask: Does size matter? Does weight matter?
2. Find mass: Weigh each object using a scale
3. Place each object gently into the water and observe whether it sinks or floats. Write it down.
4. Find the mass: Weigh each object using a scale
5. Find volume: Fill a graduated cylinder with a known amount of water. Submerge the object completely and measure how much the water level rises (this is the volume of the object). If the object floats gently push it into the water until fully submerged (you can use, for example, a pencil or a toothpick to push it down)
6. Calculate Density using the formula:

$$\text{Density} = \frac{\text{mass}}{\text{volume}}$$

The density should be in g/cm³ (reminder: 1000cm³=1L)

7. Compare results: Objects with a density greater than water ($\approx 1\text{g/cm}^3$) should sink, and those with a lower density should float.





Molecular Modeling with Gummies

Ready to turn gummy candy into science?

In this activity, scouts will use gummies to build their very own molecular models! It's like playing with candy Legos—connecting gummies to create shapes and structures that represent real-life molecules!

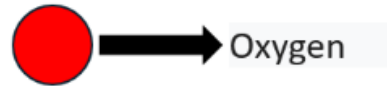
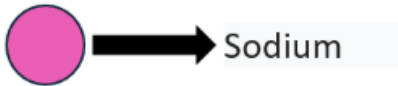
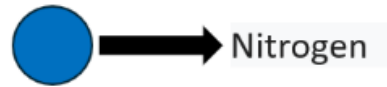
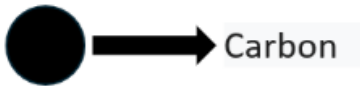
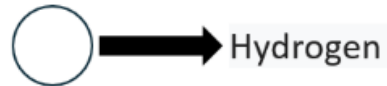
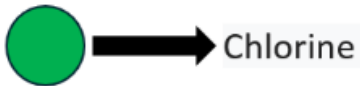
Pre-work:

- Gather supplies needed:

- Toothpicks
- Soft, circular jellied candies of a variety of colors (The colors you need will be listed in the color chart down below). You will need white or clear gummies which can be hard to find. A good substitute is small marshmallows.
- A large bowl or Ziploc bags to contain the *candy atoms*.
- Index cards with molecules

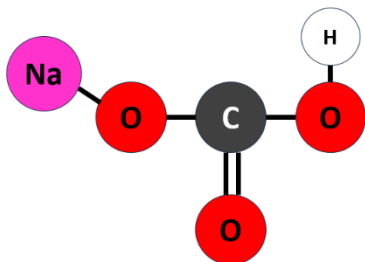
Activity:

1. Place all the jellied candies in a large bowl or Ziploc bags. You may opt to separate the candies by color, but it is not necessary.
2. Place the toothpicks on the table for easy access.
3. Before starting the activity explain to your troop what atoms are in a simple way. For example, tell them that atoms are tiny particles that connect to each other, creating molecules which are also tiny. Everything around them is made of atoms connecting to each other. Tell them that the gummies represent atoms and that by connecting these gummies together in a specific way they will be creating a model of a molecule.
4. Tell your scouts what the five molecules in the index cards represents in a simple way:
 - NaHCO_3 is baking soda. Baking soda is a popular baking ingredient. It gives foods like bread, cakes, muffins, and cookies a light, fluffy texture.
 - $\text{CH}_4\text{N}_2\text{O}$ is urea. Urea is a natural compound found in urine
 - $\text{C}_2\text{H}_6\text{O}$ is ethanol. Ethanol is found in alcoholic drinks and works as a disinfectant in hand sanitizers and medical wipes.
 - CH_2O_2 is formic acid or methanoic acid. Formic acid is used in industries for leather tanning, preserving animal feed, and controlling pests in beekeeping. It's also what ants spray when they feel threatened.
 - $\text{C}_8\text{H}_{10}\text{N}_4\text{O}_2$ is caffeine. Caffeine is a natural stimulant found in coffee, tea, energy drinks, and chocolate.
 - $\text{C}_9\text{H}_8\text{O}_4$ is aspirin. Aspirin is a type of medicine that helps reduce pain, fever, and swelling.
5. Divide your scouts into smaller groups and give each group a molecule to build. Be aware some molecules are harder to build than others.
6. Use the index cards down below as a model to build the molecules. The designated color of each atom must be respected.

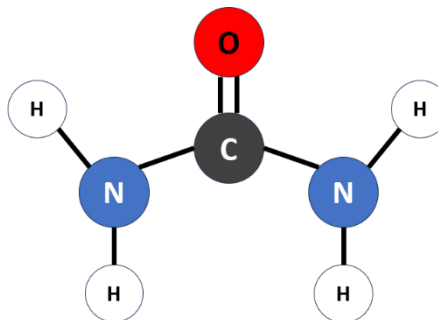


Index cards:

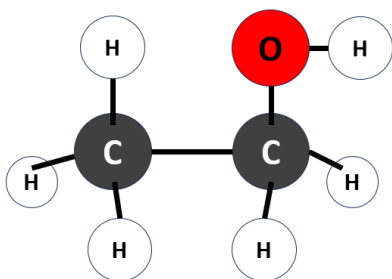
NaHCO_3 or baking soda



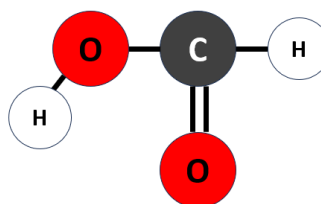
$\text{CH}_4\text{N}_2\text{O}$ or urea



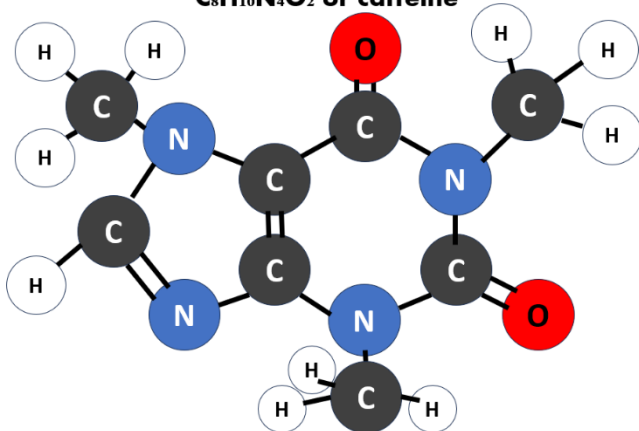
$\text{C}_2\text{H}_6\text{O}$ or ethanol



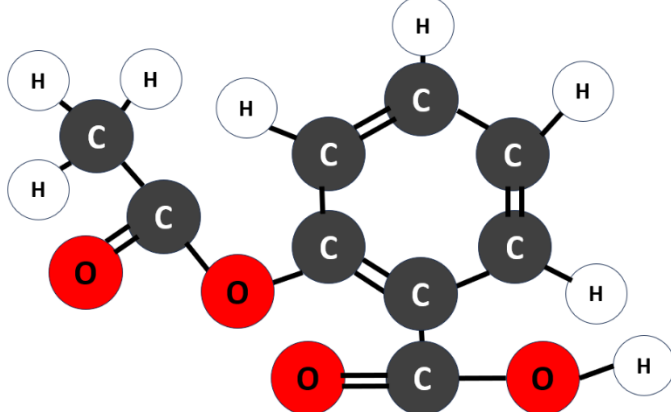
CH_2O_2 or formic acid

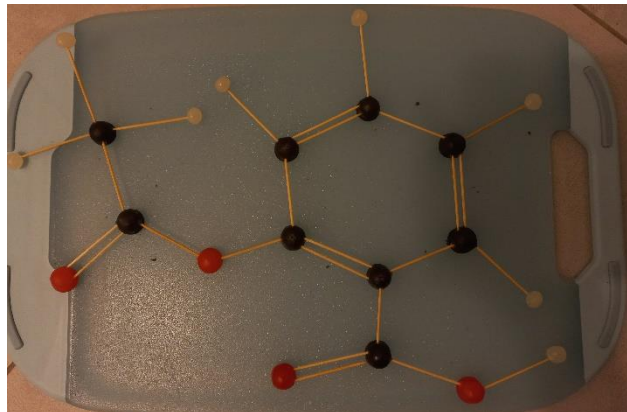
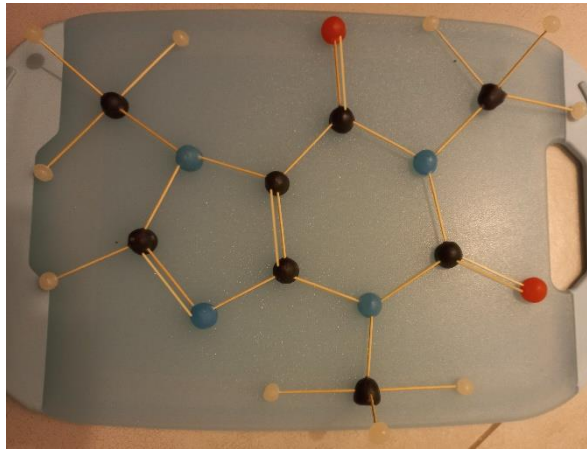
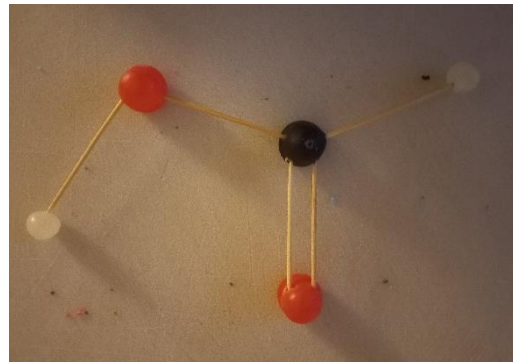
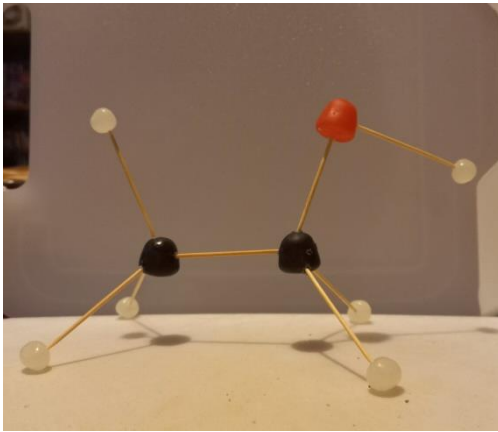
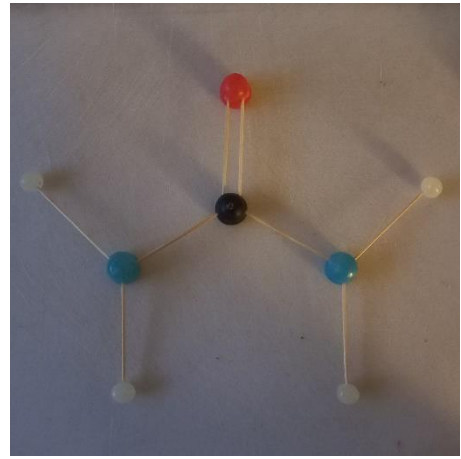
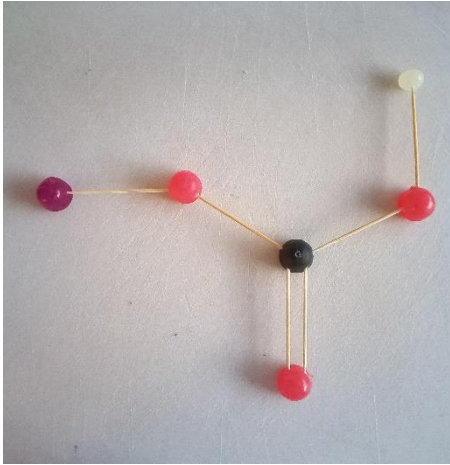


$\text{C}_8\text{H}_{10}\text{N}_4\text{O}_2$ or caffeine



$\text{C}_9\text{H}_8\text{O}_4$ or aspirin





Yeast and gas

Have you ever wondered why bread is filled with bubbles?

In this activity, scouts will explore the power of yeast as it reacts with sugar to create gas, enough to inflate a balloon!

Pre-work:

- Gather supplies needed:

- Yeast packet from your local grocery store
- Sugar
- Water
- A hot water kettle
- A glass or plastic empty bottle
- A balloon
- A funnel

Activity:

1. Blow up the balloon a few times to stretch it out.
2. Fill the bottle up with about one inch of warm water using the funnel. It is best to heat the water between 105°F and 115°F, when the water is cold the microorganisms are resting and if the water is too hot, they will die.
3. Add all the yeast packet using the funnel to the bottle and gently swirl the bottle for a few seconds.
4. Add about a teaspoon of sugar using the funnel and swirl around some more.
5. Place the balloon over the neck of the bottle.
6. Let the bottle sit in a warm place for about 20 minutes. During this time ask the scouts if they think the balloon will inflate. If all goes well the balloon will begin to inflate.
7. Tell your scouts, when heated the yeast reacts with the sugar and forms a gas (in this case CO₂). The gas inflates the balloon. In bread, this is what causes bubbles.



Biology (Choose One Activity)

The travel of water in a plant

What if you could see water travel through a plant in real time?

In this activity, Scouts will use food coloring to track the journey of water and uncover the secret pathways inside the plant.

Pre-work:

- Gather supplies needed:

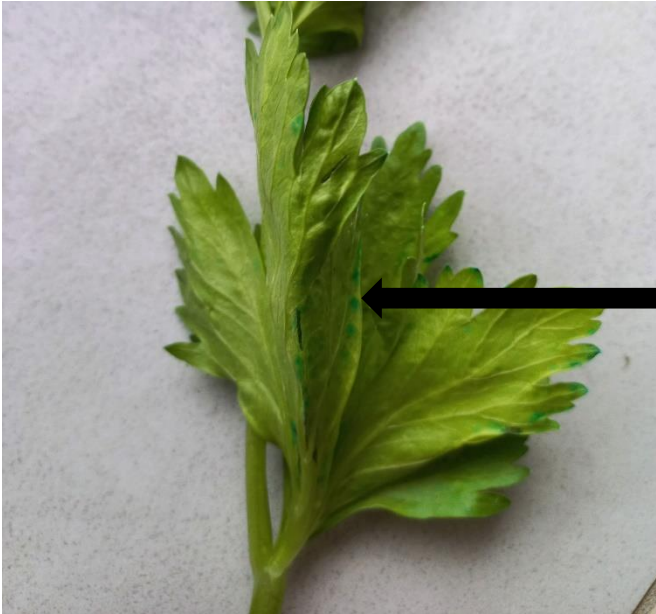
- Water
- Glass cup or vase
- Several white carnations, other white flowers, or celery stocks (I recommend using celery as it is cheaper, faster and you can observe the travel of water better through the celery's veins)
- Measuring teaspoon
- Knife
- Food coloring; blue or red are the easiest to see

- You may have a set prepared 24 to 48h in advance to discuss the results with the scouts during your meeting.

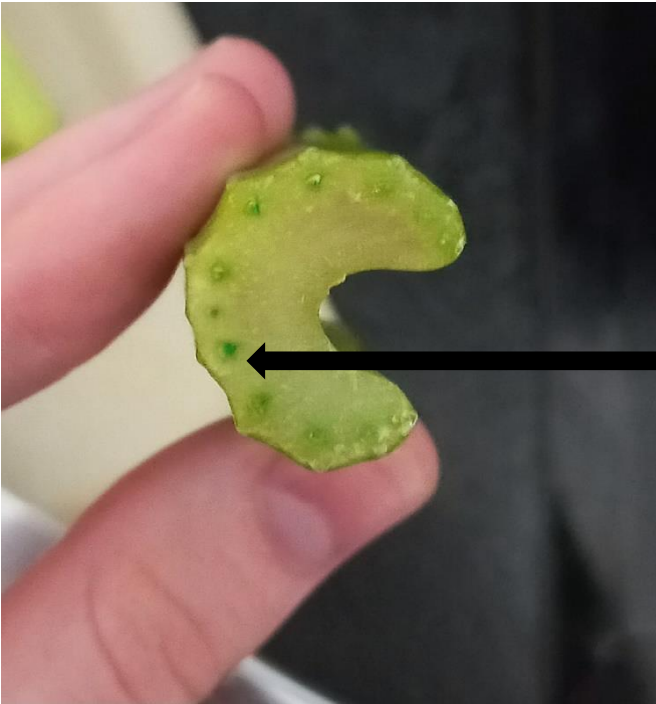
Activity:

1. Pour some water in each vase or glass cup.
2. Pour a teaspoon of food coloring in each vase or glass cup.
3. Trim the bottom of the stem at a 45° angle make sure you do this part and not your scouts. (you may also trim the bottom of the celeries)
4. Place the flowers or celeries in each vase or glass cup.
5. Ask your scouts what they think will happen. Will the water travel all the way to the petals and stain them? Will the color only stain the leaves? Will the color not stain at all?
6. If all goes well the petals and leaves should stain (the water travels all the way to the petals). However, this process may take a while. You need at least 4 hours to start seeing a result but the best is to wait 24 hours or more. If an adult prepared a set prior you may cut it during the meeting.
7. Send a picture, if possible, of the set the scouts prepared, to their parents. You can also discuss the results during the next meeting.





The blue dye is
visible on the celery



The blue dye
stained the celery's
vanes



Make something bigger

What if you could see things that are too small to spot with your eyes alone?

In this activity, scouts will use a microscope or magnifying glass to explore tiny objects up close! You'll be amazed at how much bigger and more detailed things become when you take a closer look.

Pre-work:

- Gather supplies needed:

- Plants, bugs, or others, it's up to you!
- Microscope and magnifying glass (multiple for large groups)
- Papers, pencils and coloring pens

Activity:

1. Pick out the organism that you want your scouts to analyze. If you have a large group of scouts, I recommend picking out several.
2. Ask your scouts to draw what they see with their naked eyes.
3. They will look at their organism under a magnifying glass. If you only have one, ask them to take turns.
4. Ask them to draw what they see now. Did they see more details, different patterns?
5. They will then look under the microscope.
6. Ask them to draw what they see now. Did they see more details, different patterns?

The Survival of the Fittest Utensils

What makes some species better at surviving than others?

In this activity, scouts will explore natural selection by testing how different utensils “adapt” to different tasks. By observing how well certain tools work in specific situations, you’ll discover how evolution shapes the survival of the fittest in nature.

Pre-work:

- Gather supplies needed:

- A variety of utensils (spoons, forks, chopsticks, tongs, tweezers, knife...)
- A few objects to pick up (e.g., Legos, beans or seeds).
- Timer
- A container for the objects (bucket, box, or tray)
- Scoring sheets and pens

Activity:

1. Place all the objects to be picked up in a container in the center of the play area. You can add sand, water, dirt... to make the activity harder.
2. Give each scout a different utensil (spoon, fork, chopsticks, etc.).
3. Explain the game and the concept of natural selection ("Just like animals or plants in nature, the best-adapted individuals survive and pass on their traits."). Then ask: "What do you think will happen?"
4. Start the game. Each scout has 30 seconds to pick up as many objects as they can with their utensil. The goal is to pick up a required number of objects, such as: 15 small objects (e.g., Legos or seeds)
If a scout picks up the required number of objects in that round they move on to the next round.
If a scout picks up more than the required amount, they get 1 more utensil for each 5 more object they get. This simulates a species that is well-adapted and thrives in its environment, getting a better chance at survival.
If a Scout doesn't pick up enough objects, they must give up their utensil. This simulates a species that are "less fit" for the environment and don't survive as well. However, they are not out of the game. They can help friends with more than 1 utensil.
5. Repeat this process 4 to 5 times. Each time you repeat the process the time decreases by 4 seconds.
6. Ask scouts: "What happened", "Which utensil was the most successful?", "Why do you think this or that utensil “survived”?"

Women Scientist on the Eiffel Tower

Proposed names of French women scientists whose names will be added to the Eiffel tower in 2027:

Denise ALBE-FESSARD

Yvette AMICE

Jeanne BARET

Denise BARTHOMIEUF

Madeleine BRÈS

Yvonne CHOQUET-BRUHAT

Simonne CAILLÈRE

Yvette CAUCHOIS

Edmée CHANDON

Marthe CONDAT

Anita CONTI

Eugénie COTTON

Radhia COUSOT

Odile CROISSANT

Marie CURIE

Augusta DÉJÉRINE

Henriette DELAMARRE

Georgette DÉLIBRIAS

Nathalie DEMASSIEUX

Rose DIENG

Angélique DU COUDRAY

Louise DU PIERRY

Henriette MATHIEU-FARAGGI

Jacqueline FERRAND

Jacqueline FICINI

Rosalind FRANKLIN

Marthe GAUTIER

Sophie GERMAIN

Jeanne GUIOT

Geneviève GUITEL

Sébastienne GUYOT

Claudine HERMANN

Andrée HOPPILLIARD

Marie-Louise DUBREIL-JACOTIN

Irène JOLIOT-CURIE

Geneviève JOURDAIN

Dorothea KLUMPKE

Lydie KOCH

Colette KREDER

Nicole LAROCHE

Cornélie LEBON-DE BRAMBILLA

Yolande LE CALVEZ

Paulette LIBERMANN

Marianne GRUNBERG-MANAGO

Nicole MANGIN

Cécile MORETTE

Edith MOURIER

Ethel MOUSTACCHI

Suzanne NOËL

Yvonne ODIC

Isabelle OLIVIERI

Marie-Louise PARIS

Marguerite PEREY

Claudine PICARDET

Alberte PULLMAN

Pauline RAMART

Lucie RANDOIN

Alice RECOQUE

Michelle SCHATZMAN

Anne-Marcelle SCHRAMECK

Marie-Hélène SCHWARTZ

Josiane SERRE

Alice SOLLIER

Hélène SPARROW

Bianca TCHOUBAR

Marie-Antoinette TONNELAT

Thérèse TRÉFOUËL

Agnès ULLMANN

Arlette VASSY

Suzanne VEIL

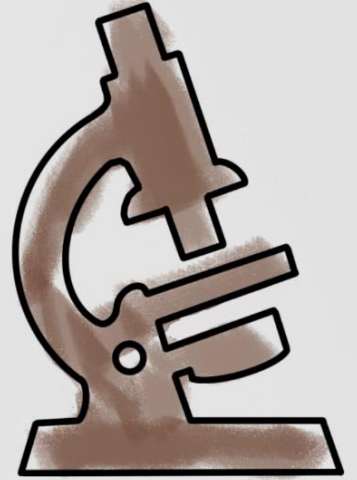
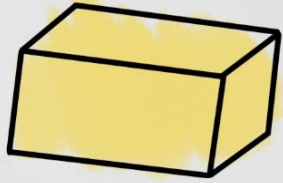
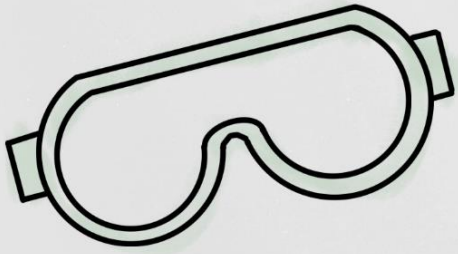
Jeanne VILLEPREUX

Toshiko YUASA

It is noteworthy that not all of the women are French, however, they did have some connection to France.



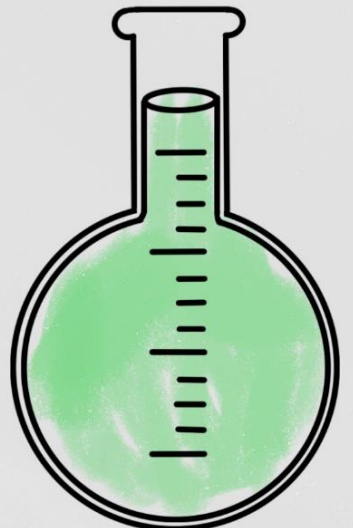
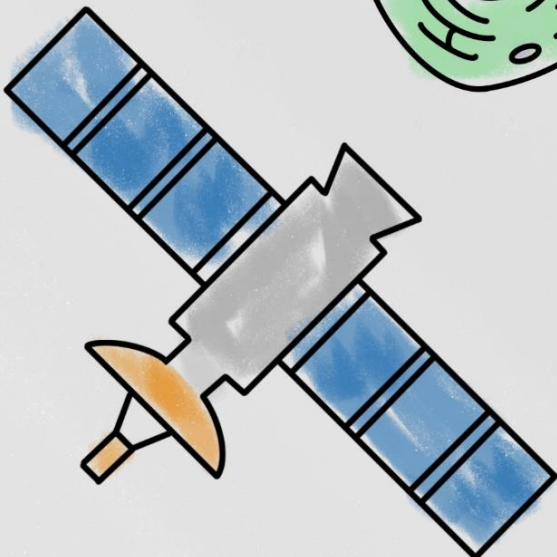
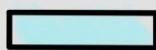
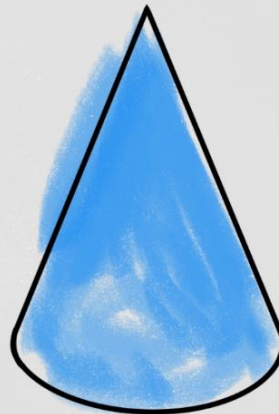
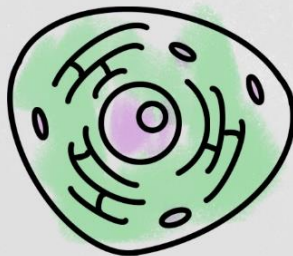
DAISIES & BROWNIES Coloring book



BASIC SCIENCE

COLORING

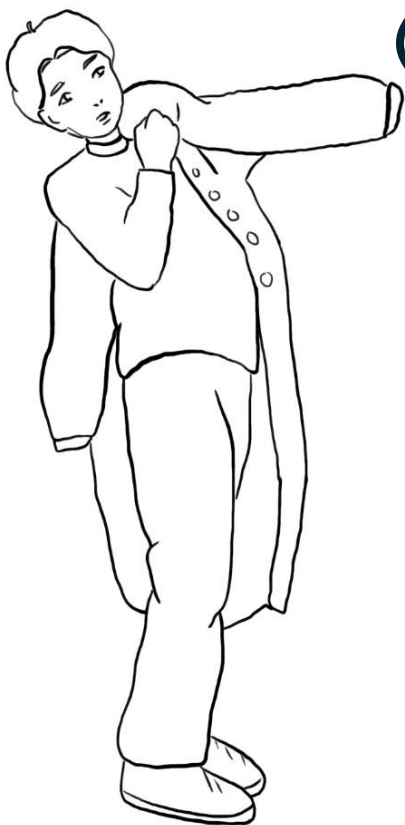
BOOK





Hey Leo, I have science homework due tomorrow. First, I need to learn about four scientists, and then I have to do four activities, one for each of the basic sciences: math, physics, chemistry, and biology. Will you help me?

Of course I will! Maybe we can start by asking Mom, Dad, Grandpa and Grandma who their favorite scientists are.



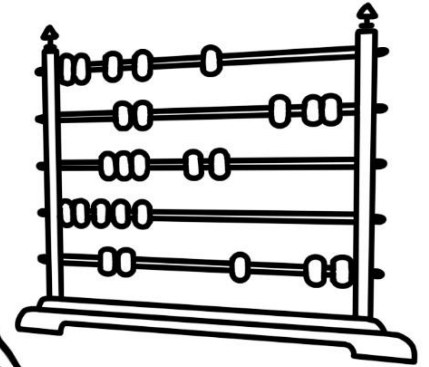
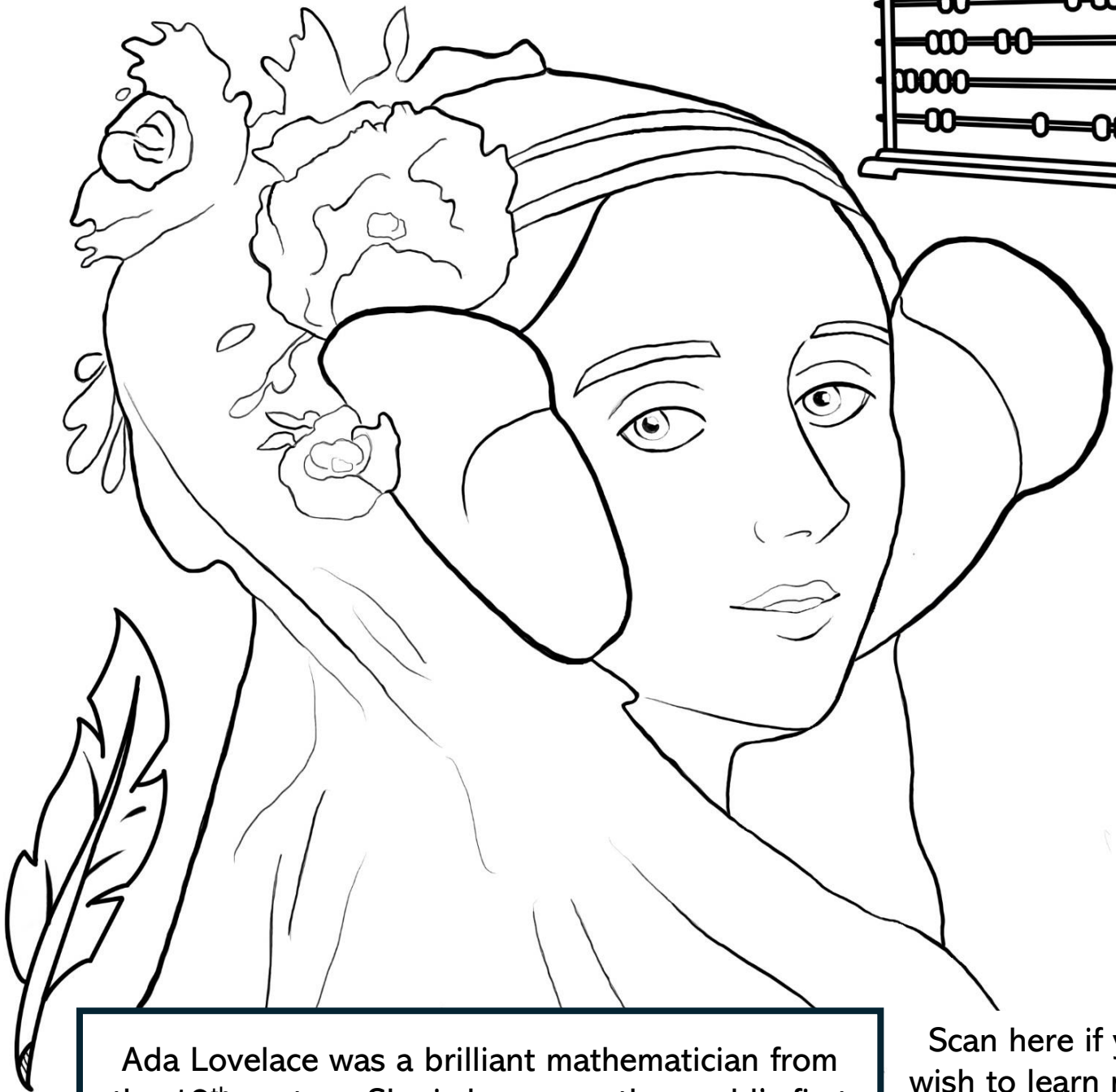
OK. Let's go!





Hi Dad. Who is your favorite scientist?

Hmm...I'd have to say Ada Lovelace.



Ada Lovelace was a brilliant mathematician from the 19th century. She is known as the world's first computer programmer, even before computers were invented! She worked with a scientist named Charles Babbage and wrote notes for his early machine that included the first computer algorithm.

Scan here if you wish to learn more

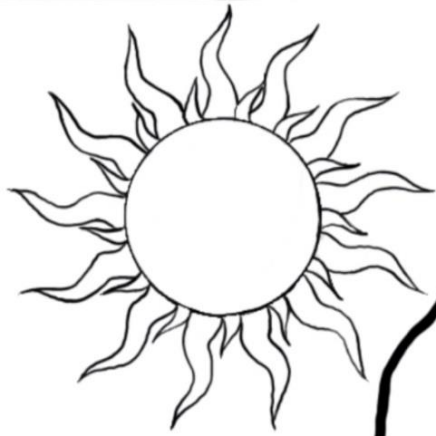




Hi Grandpa. Who is your favorite scientist?



Definitely Nicolaus Copernicus.



Nicolaus Copernicus was a famous astronomer from the 16th century. At a time when most people believed the Sun went around the Earth, he discovered that the Earth and other planets move around the Sun. His idea changed how people understood space and helped start modern astronomy.

Scan here if you wish to learn more

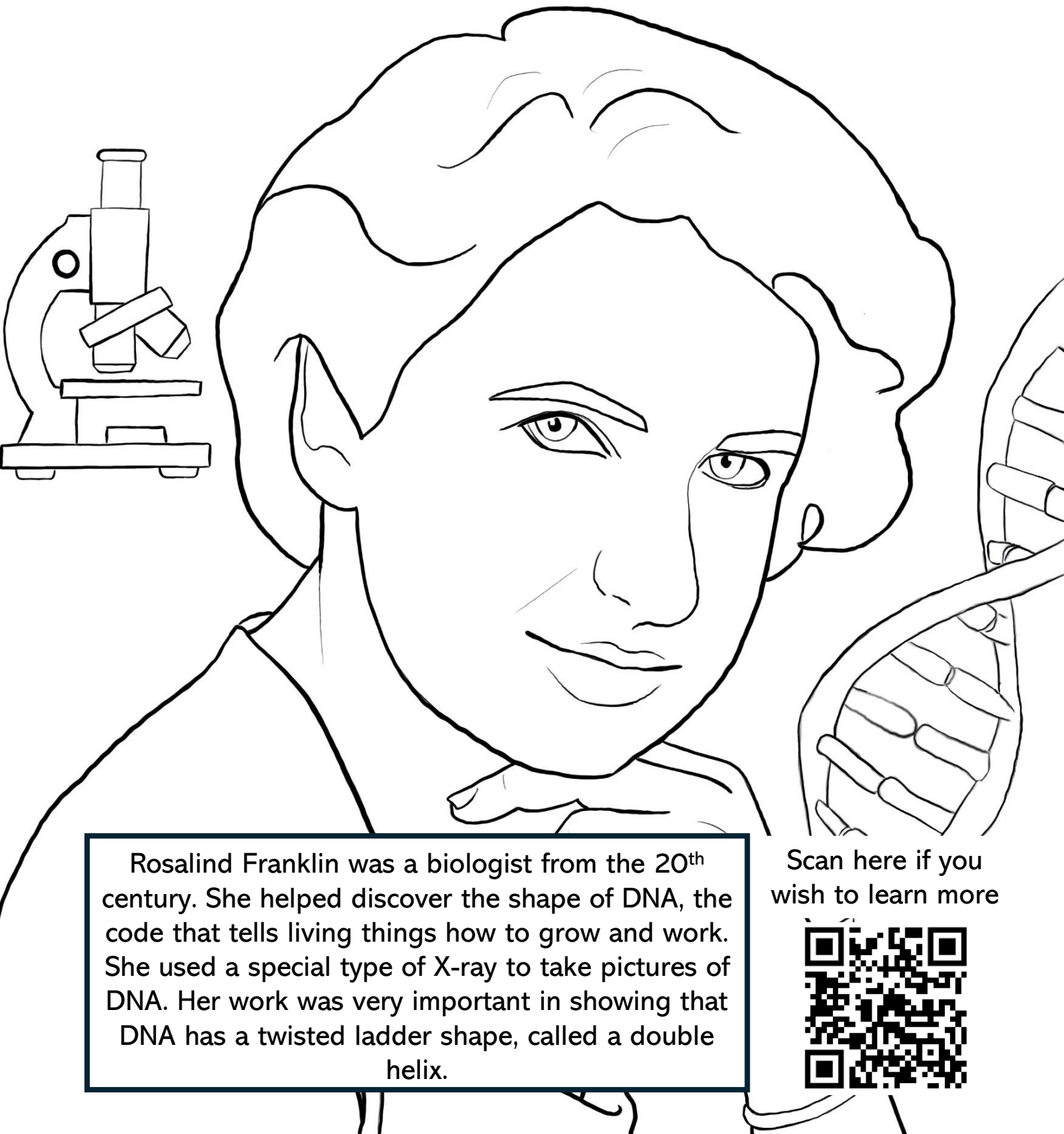




Hi Grandma. Who is your favorite scientist?



Probably Rosalind Franklin.



Rosalind Franklin was a biologist from the 20th century. She helped discover the shape of DNA, the code that tells living things how to grow and work. She used a special type of X-ray to take pictures of DNA. Her work was very important in showing that DNA has a twisted ladder shape, called a double helix.

Scan here if you wish to learn more





Hi Mom. Who is your favorite scientist?



I think it's Alessandro Volta.



Alessandro Volta was an Italian scientist from the 18th century. He helped us understand electricity. He is best known for inventing the first electric battery. His invention showed that electricity could be created using certain metals and liquids. The word "volt," which we use to measure electricity, is named after him.

Scan here if you wish to learn more



Okay, now that we've met our scientists, let's try the first activity: math! This one's a connect-the-dots puzzle. Just follow the numbers in order and see what appears!





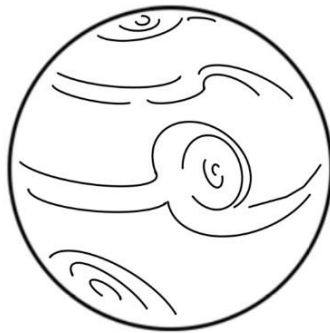
Next up physics! Let's color the planets, but we have to use the right colors. If you're not sure you can ask your parent or look it up using the QR code.



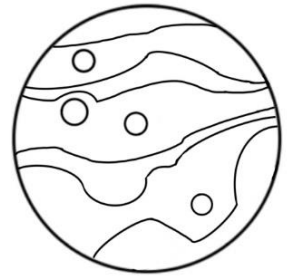
Earth



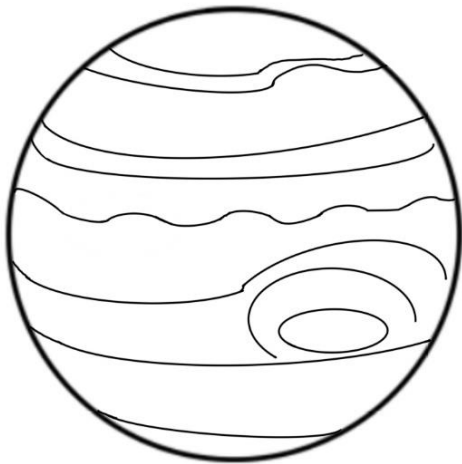
Mercury



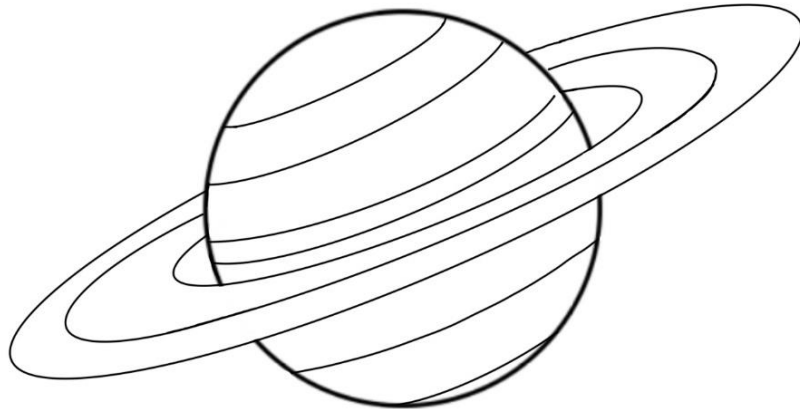
Venus



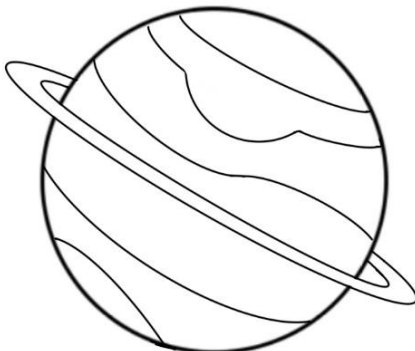
Mars



Jupiter



Saturn



Uranus



Neptune

Time for chemistry! In this activity, we have to find the tools scientists use in a lab. Can you spot the **lab coat**, **beaker**, **flask**, **test tubes**, and **safety goggles**?

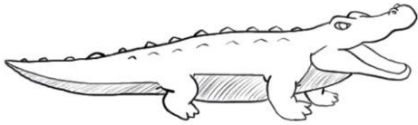




And finally, biology! In this activity, we have to connect each animal to the right category. Let's see if we can match them all correctly!



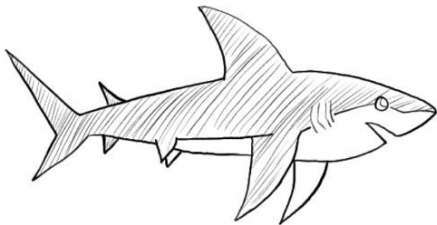
- Bird



- Fish



- Amphibian



- Reptile



- Mammal

Good job!



**High five! We
did it!**