

JUNE KIT GUIDE

MAD SCIENTIST LAB

WHAT IS THIS GUIDE ALL ABOUT?

Welcome to the Kit of the Month Club - Summer Edition! This is your trusted kit guide for the month of June. You're about to dive into the Mad Scientist Lab, a collection of activities and projects that will create a laboratory young scientists can call their own! They will experience color and light with color mixing, Jelly Marbles, and create Bubbling Blobs in their very own indestructible Baby Soda Bottle test tubes to discover density. Everything you need is included in this kit or can be easily accessed by an adult. That means there's only one thing left to do... SCIENCE!

Wait, wait, wait! Before you get completely enthralled in your Mad Scientist Lab, we wanted to let you in on a secret to help stop summer learning loss: **YOU CAN DO MORE ACTIVITIES AFTER YOU'VE COMPLETED THE GUIDE!** Once you've wrapped up all the experiments in your June guide, head to SteveSpanglerScience.com/lab for more experiments, projects, and how-to videos to discover even more uses for your Mad Scientist Lab.



EXPERIMENT MATERIALS AND STEPS

When this icon is placed next to an experiment, you'll know the following pages will contain a complete list of experiment ingredients, steps and expert tips!



TAKE IT FURTHER

This icon is shown when there is an opportunity for you to take the experiment to the next level. Whether that's changing location, ingredients or amount of ingredients, the possibilities are endless!



HOW DOES IT WORK?

This icon will explain the science behind the experiment it is shown after. In this section you will find different principles, theories and ways to tie the experiment into a lesson plan for almost any age.



BONUS MATERIAL

BONUS MATERIAL! When this icon appears, you will know it's an extra activity the Spangler team decided to throw into the mix to make the most of your kit!

A WORD ABOUT SAFETY

Everything we suggest using in this guide is safe when used with proper adult supervision. That's right... the activities in this guide require adult supervision. This guide is not intended to be downloaded and tossed at a kid with the instructions, "Have fun." Instead, you might want to use this opportunity to interact with a few ankle-biters and learn a little science at the same time. We guarantee that young scientists will get a lot more from the experience if you're there to guide them.

Remember that this is science, and science tends to get a bit messy. There are liquids, so you will get wet. Stuff falls on the floor... so you'll need to clean it up so people don't slip and fall. Don't put chemicals in your eyes or ears and don't eat your experiment. Trust us, they don't taste good and it's a bad thing to do.

The bottom line is that this science experiment guide requires adult supervision and common sense. These simple concepts that help ensure a fun and safe experience.



TEST TUBE COLOR MIXING

MATERIALS

- TWO BABY SODA BOTTLES
- WATER
- COLOR FIZZERS
- ADULT SUPERVISION



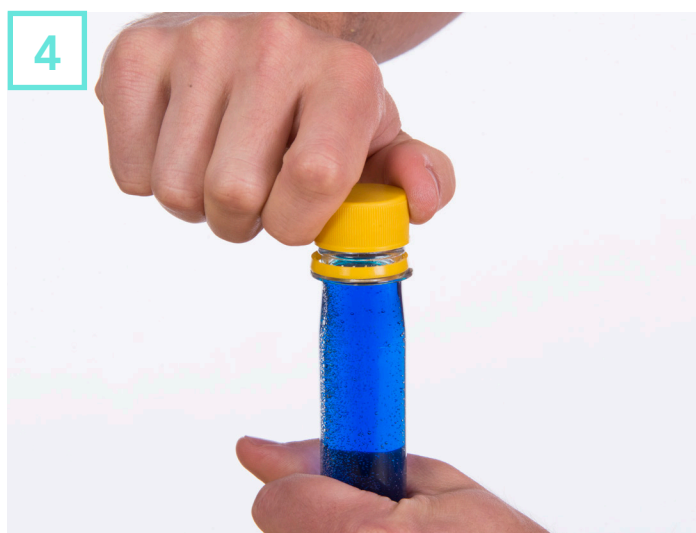
Take two Baby Soda Bottles and fill them almost to the top with water.



Color one test tube with a blue Color Fizzer, and another test tube with a yellow fizzer.



Watch how the pigment from the Color Fizzer spreads throughout the water.

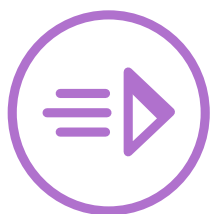


Seal both Baby Soda Bottles off with Baby Soda Bottle caps.

5



Overlap the blue and yellow Baby Soda Bottles and peer through them over a light source.



TEST TUBE WHEEL

MATERIALS

- ONE ADDITIONAL BABY SODA BOTTLE
- COLOR FIZZERS
- WATER
- RUBBER BANDS
- ADULT SUPERVISION

- 1 Create another color tube by using one Baby Soda Bottle, one red Color Fizzer and water.
- 2 Wait for the Color Fizzer to stop fizzing and cap off the Baby Soda Bottle.
- 3 Bundle the blue, yellow and red color stick and rubber band them together.
- 4 Hold the tube trio up to your eyes and look at the light again. What colors do you see this time? You can slowly twist the test tubes and watch the colors change right before your eyes.





HOW DOES IT WORK?

The solutions appear to change color right before your eyes when you look through them. However, you're actually altering the amount of light that is able to reach your eyes!

When you use the Color Fizzers to alter the color of water in each of the three Baby Soda Bottles, you create solutions that absorb specific light colors. The red water absorbs all colors except red, the blue absorbs all but blue, and the yellow... well, you get it. If you look through two or three Baby Soda Bottles, though, the light changes colors again!

When you combine two primary colors you get the secondary colors: green, purple, and orange. The individual colored liquids in the Baby Soda Bottles are not mixing. The color mixing that happens is due to the light passing through the colored liquids. The light passes through both, absorbing all but the colors of the water, which mix and make secondary colors in your eyes. Your eyes can't distinguish the two colors being passed through the water, so they mix them into one!





COLOR MIXOLOGY

MATERIALS

- 9 OZ PLASTIC CUPS
- PIPETTES
- COLOR FIZZERS
- 24 WELL TRAY
- WATER
- ADULT SUPERVISION



Fill the three plastic cups 3/4 full with water.



Color the water by placing one Color Fizzer tablet in each cup. One red, one yellow and one blue.



Watch how the pigment from the Color Fizzers spread throughout the water.



Find the three pipettes and place one into each cup.

4

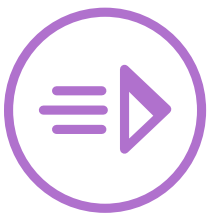


Using a pipette, pick one of the wells in the tray and add a little squirt of a color.

5



Now add a few droplets of another color and voila! You color-mixed! How many colors can you make?



KEEP A COLOR

1

When all 24 wells are filled with mixed colors, add one Jelly Marble to each of the wells.

2

Set your experiment aside for a few hours in order for the marbles to grow.

!

You will know the Jelly Marbles are full grown when the colored water has become big, plump, and about the size of a marble.

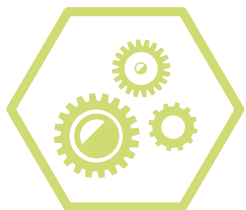
3

Since the Jelly Marbles are non-toxic, you can remove them from their wells and observe how they changed. Let the water in the marbles evaporate and the Jelly Marbles will shrink back to their original size to be used again and again.



MATERIALS

- JELLY MARBLES
- ADULT SUPERVISION



HOW DOES IT WORK?

Like all of our fun and fascinating polymer products, these tiny spheres teach a big lesson in color, light, and the importance these thirsty pebbles can play in maintaining a healthy environment. The possibilities for experimentation are endless when you drop these spheres in water. Put them in one of our Baby Soda Bottles and they grow to the shape of the test tube. Try drying them out to see how quickly evaporation can take over, then use them again and again.

These tiny spheres are made from a superabsorbent polymer called sodium polyacrylate. A polymer is simply a long chain of repeating molecules. If the prefix “poly” means many, then a polymer is a large molecule made up of many smaller units, called monomers, which are joined together like a chain. Some polymers are made up of millions of monomers.

Super absorbent polymers expand tremendously when they come in contact with water because water molecules are drawn into and held by the molecules of the polymer. The polymer chains act like giant sponges. Some can soak up as much as 800 times their weight in water!





PRIMARY JELLY MARBLES

MATERIALS

- JELLY MARBLES
- 9 OZ PLASTIC CUPS
- ADULT SUPERVISION
- WHITE SCOOP
- PRIMARY COLORED WATER



Fill the three plastic cups 3/4 full with water. Color one red, one blue and one yellow using Color Fizzers.

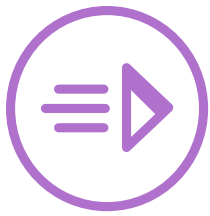


Using the white scoop, pour one scoop of Jelly Marbles into each of the three cups.



Soak the marbles for at least three hours, checking on them every so often to check on their progress. Make sure to notice the changes in shape and size as they grow. The marbles will become unique shapes as they grow.





PETRI COLOR MIXING

MATERIALS

- PETRI DISH
- ADULT SUPERVISION

- 1 Add a few of each colored Jelly Marbles to the petri dish.
 - 2 Make sure each color only takes up 1/3 of the petri dish, like slices of pie.
 - 3 Over the next few days, your marbles should have mixed colors and become a beautiful rainbow in the petri dish.
- ! Explain to your scientists that the primary colors (red, yellow, blue) mix together to make secondary colors (orange, green, purple).





HOW DOES IT WORK?

This experiment illustrates a more advanced, but still amazing aspect of Jelly Marbles. Jelly Marbles are a perfect model of the science of osmosis. The marbles allow water molecules to pass through their hydrophobic outer surface. Osmosis refers to the diffusion of molecules (water molecules in this case) through a semi-permeable membrane (the Jelly Marble). Since all of the marbles are performing this action, water molecules from one Jelly Marble wind up in a neighboring marble of a different color, causing the colorful rainbow you see.





BUBBLING BLOB

MATERIALS

- OIL-FILLED BABY SODA BOTTLE
- WATER
- ADULT SUPERVISION
- FLAT FIZZERS
- COLOR FIZZERS



Open the Baby Soda Bottle with cooking oil.



Fill the Baby Soda Bottle cap with water and pour it into the tube. What do you notice about the oil and water?



Choose a blue, red or yellow Color Fizzer and drop it into the Baby Soda Bottle containing oil and water.



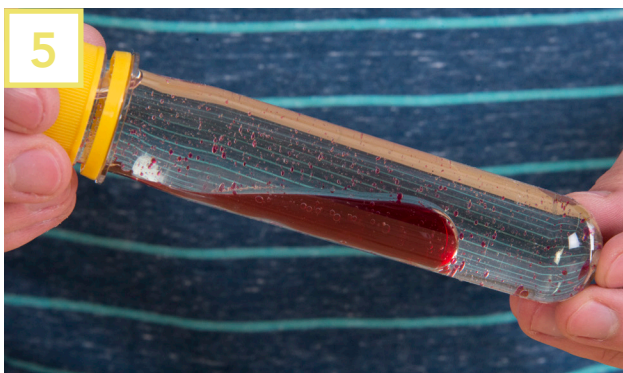
Watch what happens when the Color Fizzer comes into contact with the water.



Once the Color Fizzer stops fizzing, use a Flat Fizzer to get the concoction bubbling again.



After the blobs have stopped bubbling up, fill the rest of the tube with water until it's almost overflowing. Cap the tube tightly, and wipe off any excess oil with a paper towel.



Tip the test tube back and forth and watch what happens. The tiny droplets of colored liquid join together to make one big blob!



BUBBLING RAINBOW

MATERIALS

- 6 BABY SODA BOTTLES
- BABY SODA BOTTLE RACK
- VEGETABLE OIL
- ADULT SUPERVISION
- FLAT FIZZERS
- COLOR FIZZERS
- WATER



1

Fill all 6 Baby Soda Bottles to the cap line with vegetable oil and place them in the rack. Then add a capful of water to each of the test tubes.

2

Put each the following in one test tube, from left to right :

- 1 Red Color Fizzer
- 1 Red and 1 Yellow Color Fizzer
- 1 Yellow Color Fizzer
- 1 Yellow and 1 Blue Color Fizzer
- 1 Blue Color Fizzer
- 1 Blue and 1 Red Color Fizzer



!

Watch as the Color Fizzers react in the water and begin to create blobs of color.

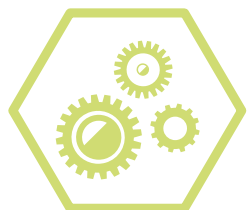


!

Do not cap the Baby Soda Bottles while this is happening. The bubbling will build pressure inside the bottle and, although small, there is a risk of causing harm from the pressure.

3

You've created a Bubbling Rainbow! When the bubbling slows down, add a Flat Fizzer to each Baby Soda Bottle to start the process all over again!



HOW DOES IT WORK?

First of all, you confirmed what you probably already knew: oil and water don't mix! Even if you shake or stir the mixture like crazy, the water breaks up into smaller blobs, but it still won't mix with the oil. You also may have noticed that the Color Fizzers only mix with water. They don't color the oil at all! Blobs of color you see in the oil are just tiny colored water droplets.

When you pour the water into the container with the oil, the water sinks quickly to the bottom and the oil stays on top of the water. This is exactly what happens when oil from a damaged ship spills into the ocean. Oil floats on the surface because it's "lighter" than water.



COLOR MIXING WHEEL

MATERIALS

- CARDBOARD
- SCISSORS
- RED, BLUE AND YELLOW MARKERS
- 36" OF STRING
- ADULT SUPERVISION



- 1 Trace a 4-6" circle onto the cardboard using any circular template you may have. Examples are a cream cheese lid, pickle jar or plastic cup.
- 2 Cut out the circle you traced with scissors.
- 3 Trace 3 smaller circles on the cardboard disc like a target. Try to make each of the circles equal in width. This will enhance the visual aspect of the experiment.
- 4 Draw a single line through the middle of the disc that spans the entire diameter of the disc. Each of the three circles in the disc should now be divided in half.
- 5 Color half of the smallest circle blue and the other half yellow. Color the middle circle half red and half yellow. Finally, color the largest circle half blue and half red.
- 6 Using the pointed tip of the scissors, place two holes in the cardboard disc. Make sure the holes are an equal distance from the center of the disc and are about 1 inch apart.
- 7 Thread the string or yarn through each of the holes in the disc and tie the ends of the string together.
- 8 Wind the strings up and pull in opposite directions to watch the colors swirl and mix magically!



DISAPPEARING COLOR WHEEL

MATERIALS

- CARDBOARD
- 36" OF STRING
- RULER
- RED, ORANGE, YELLOW, GREEN, BLUE AND PURPLE MARKERS
- PENCIL
- WHITE PAPER
- SCISSORS
- ADULT SUPERVISION
- GLUE



- 1 Using a circular template (can be anything like a container lid, jar or cup), trace a circle onto the white paper and the cardboard using your pencil.
- 2 Cut out the circles you traced with scissors.
- 3 Use a ruler and pencil to divide the paper circle into 6 even sections.
- 4 Color each of the 6 sections a different color using your markers.
- 5 Glue the colored circle and cardboard together with the colored side out.
- 6 Poke two small holes through the wheel, near the center of the circle.
- 7 Thread the string or yarn through each of the holes in the disc and tie the ends of the string together.
- 8 Wind the strings up and pull in opposite directions. Watch in amazement as the colors disappear!



CARDBOARD KALEIDOSCOPE

MATERIALS

- CARDBOARD
- TAPE
- SCISSORS
- RULER
- PLASTIC WRAP
- ALUMINUM FOIL
- GLITTER AND BEADS
- ADULT SUPERVISION



- 1 Cut one side of the cardboard box out to form a long and flat piece.
- 2 Lay aluminum foil on one side of the cardboard and fold over the sides.
- 3 Using a marker and ruler, lightly mark the cardboard into thirds.
- 4 Fold the cardboard along the thirds and fold together to make a triangle.
- 5 Tape the tube together to make it a secure shape.
- 6 On one end of the tube, secure a piece of plastic wrap with tape over the opening.
- 7 Add glitter and beads to the top of the plastic wrap.
- 8 Secure a second piece of plastic wrap over the beads to keep them in place. Peer through the kaleidoscope and rotate slowly to watch new shapes take form inside the tube!