



Maker Madness

TAKE + MAKE EDITION



The Achieve Foundation is the education foundation for the South Orange-Maplewood School District. We promote high-quality education that prepares students for the future. We support our students, families and educators by addressing inequities, inspiring innovation and fostering community. We believe all students and educators thrive in an equitable and innovative educational environment.

The Achieve Foundation is a non-profit 501(c)(3) organization commonly referred to as a Local Education Foundation (LEF). LEF's are independent, community-based organizations that raise funds from private sources to improve educational programs and facilities in their local public schools. Achieve is a member of the New Jersey Education Foundation Partnership (NJEEP)

AchieveFoundation.org

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The following “On Your Own (OYO)” projects were put together by the MAPSO MAKERS, a FIRST® LEGO® League robotics team made up of 8th grade girls from South Orange Middle School. All of these projects should be able to be completed with materials around the house, including what’s in your recycling bins!



www.firstlegoleague.org

If you are a K-8 student in the SOMSD community and have interest in coding, robotics, community projects or just playing with LEGO bricks, you may want to learn more!

This community team runs outside of the school system by Maplewood dad Brad Schenker and SOMS middle school choir teacher Jake Ezzo. Email MAPSOFLL@gmail.com for more information!

‘OYO’ PROJECTS

Fidget Spinner

Created by Alexa Garrido

8th Grader at SOMS and member of the FIRST® LEGO® League MAPSO Makers

The Bouncing Egg Experiment!

<https://coolscienceexperimentshq.com/bouncy-egg/#Instructions>

Invisible Fire Extinguisher

<https://www.scitech.org.au/experiment/invisible-fire-extinguisher/>

Wind Powered Car

<https://www.scientificamerican.com/article/build-a-wind-powered-car/>

Balloon Races

<https://www.learner.org/series/project-playbook-educator-edition/balloon-race/>

Recycled Fidget Spinner Project

Created by Alexa Garrido

(Parental supervision suggested)

Materials needed:

- Cardboard
- Two plastic bottle caps
- One lollipop stick
- Scissors
- Hot glue
- Colored marker/crayon or colored paper

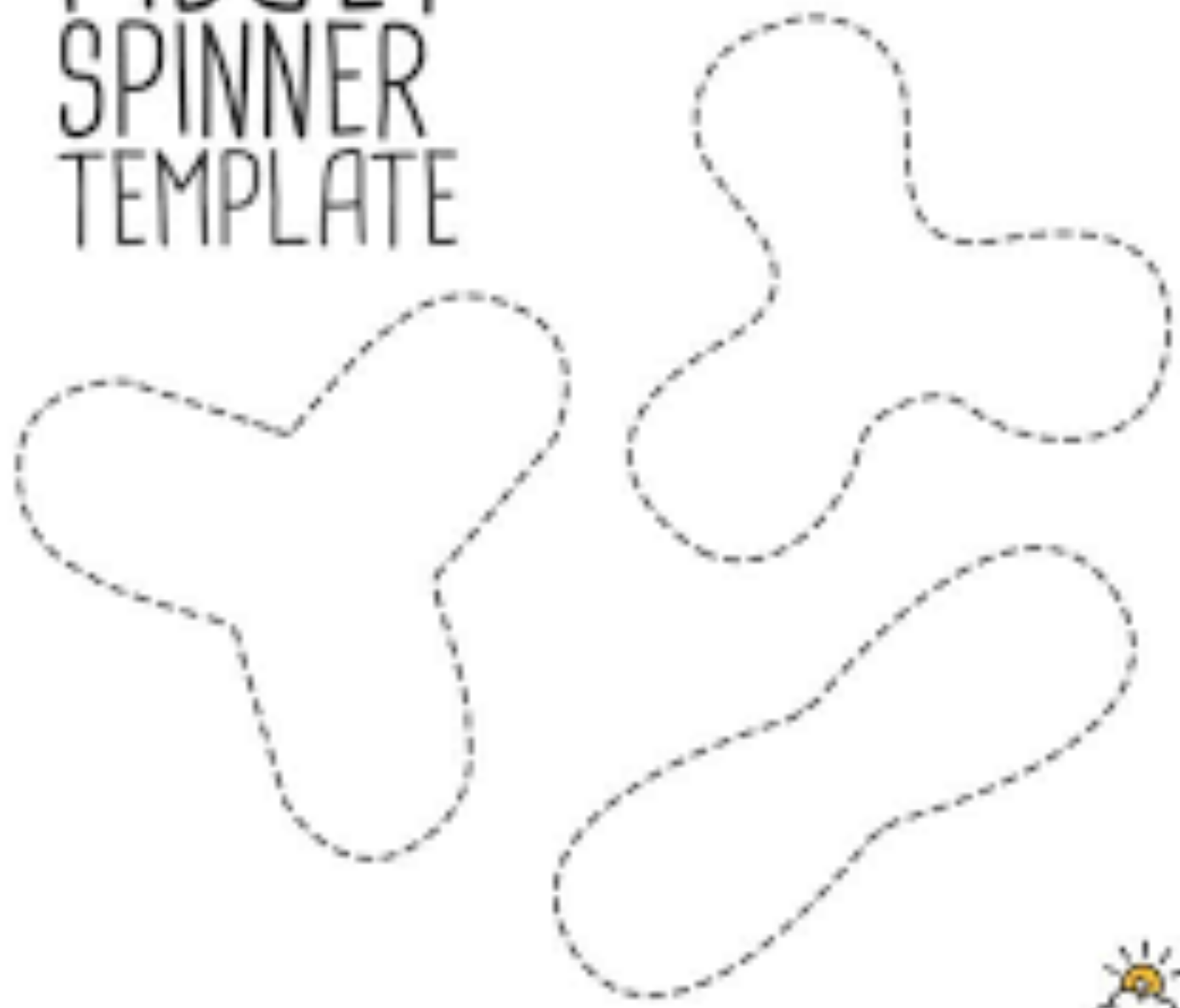
Steps:

1. Gather all the materials and get to a clean workspace.
2. Using one of the three templates (next page), cut out a fidget spinner shape out of cardboard.
3. With parental supervision, poke a hole in the middle of the shape you just cut out with the scissors, and try not to make the hole too big, as the lollipop stick is going to fit in it.
4. If you have a marker, or crayon, you can color both sides of the cardboard shape. If you have colored paper instead, then cut two pieces of paper that are the exact same shape as the cardboard and poke a hole in the same place as the hole in the cardboard.
5. If you are using crayons or markers, please skip this step. Glue the colored paper on either side of the cardboard, and if you need to fix the hole, please do so.
6. Now, poke the lollipop stick through the cardboard, and cut it so about a half of an inch is poking from either side of the cardboard.
7. Now, with parental supervision, glue each end of the lollipop stick to the inside middle of a plastic water bottle cap.
8. Now once everything is glued and dried, put one finger on each bottle cap, and spin, and enjoy!





FIDGET SPINNER TEMPLATE



The Bouncing Egg Experiment!

From Cool Science Experiments HQ

For Videos and more info, visit

<https://coolscienceexperimentshq.com/bouncy-egg/#Instructions>

Supplies Needed

- Raw Egg
- Glass or Jar
- Vinegar

Step 1 – Get a raw egg and carefully place it into a glass or jar. Then fill the glass with white vinegar until the egg is completely submerged.

Step 2 – Leave the egg in the glass for 2-3 days. Each day, check back on the egg. Make some observations. Do you notice any changes to the egg? Is anything happening to the vinegar? Write down your observations each day. After about 3 days the egg will start to become translucent and you will know it is ready to move to step 3.

Step 3 – Carefully remove the egg from the glass and rinse it under some tap water. While rinsing the egg, gently rub the outside of the egg and the white film will come off leaving you with a translucent egg. Examine the egg and make some observations. Does the egg look different from when you started the experiment? Does the egg feel different? Perhaps you notice that it feels rubbery (like a bouncy ball). Write down your observations.

Step 4 – Over a plate or other container, lift the egg 1-2 inches in the air, let go, and watch it bounce. Make some observations. What happens to the egg? Does it bounce? Is this different than what you expected?

Step 5 – When you are ready for some messy fun, lift the egg a little higher in the air and let it go...SPLAT!

How Does the Bouncy Egg Science Experiment Work - The egg becomes bouncy as a result of a chemical reaction between the eggshell and the vinegar. The eggshell of a chicken egg is made of calcium carbonate, and vinegar is a weak acid. If you've ever mixed baking soda and vinegar together, you know the violent reaction that results. The calcium carbonate that makes up the eggshell will react with the vinegar the same way baking soda reacts with vinegar (just a lot less violently). You know the vinegar and calcium carbonate of the eggshell are reacting because of the small bubbles that form around the egg when it is placed in the vinegar. These small bubbles are carbon dioxide gas, which are the result of the reaction between calcium carbonate and vinegar.

Once the shell of the egg is gone, all that is left covering the egg is a thin membrane. The vinegar begins working on the egg's membrane. The membrane of a chicken egg is **selectively permeable**. The vinegar is able to cross the selectively permeable membrane of the egg through **osmosis**. The vinegar toughens up the membrane of the egg making it bouncy!

Invisible Fire Extinguisher

<https://www.scitech.org.au/experiment/invisible-fire-extinguisher/>

[Check out this video when you're done](#)

<https://youtu.be/Y9xbtOBw8nM>

What you'll need:

- Candle
- Cup or Jar with lid
- Baking soda
- Vinegar
- Lighter
- Teaspoon

Warning: *This experiment involves fire, so make sure there is a responsible adult nearby to supervise. We recommend conducting this experiment indoors to avoid any surprise gusts of wind that may interfere with your experiment.*

Instructions

Learn how a fire burns and the chemical reaction behind combustion. For a fire to burn, three factors must be present: oxygen (O₂), fuel, and heat, this is called the combustion triangle. Using a few simple household ingredients let us show you how to put a flame out without touching it!

Instructions

1. Pour a quarter of a cup of vinegar into the jar.
2. Light the candle.
3. Add a teaspoon of bicarb soda to the vinegar. Your jar's contents should be fizzing and creating bubbles – these bubbles contain carbon dioxide. Put the lid onto your jar immediately to trap the carbon dioxide.
4. When you're ready to put out the candle, hold the jar near your candle and unscrew the lid, tipping the jar so that the carbon dioxide flows out and extinguishes the flame.

Did it work? Did you have to put the cup a certain distance from the candle? Above it? Below it? Did you experiment with how far away the cup could be from the flame?

Wind Powered Car

<https://www.scientificamerican.com/article/build-a-wind-powered-car/>

[Watch a Video](#)

Materials

- Corrugated cardboard
- Construction paper or cardstock
- Three wooden skewers
- Two plastic straws
- Four plastic bottle caps
- Tape
- Scissors
- Hobby knife
- Fan
- Flat, smooth surface
- Adult helper

Preparation

1. Carefully cut out a piece of cardboard to form the body of your car.
2. Tape two straws across the bottom of your car, one at each end. Make sure the straws are parallel.
3. Have an adult use the hobby knife to carefully poke a "+"-shaped hole in the center of each bottle cap.
4. Push a wooden skewer through the hole in one of the bottle caps (and please push it away from your face!).
5. Thread the other end of the skewer through one of the straws.
6. Push a bottle cap onto the end of the skewer opposite the first bottle cap. You just made an axle with two wheels for your car!
7. Repeat these steps to make the other axle.
8. Make sure the axles can spin and the car can roll smoothly without getting stuck. If needed, adjust the wheels so they are not too wobbly.
9. Have an adult use the hobby knife to carefully poke a small hole in the middle of the cardboard.
10. Insert a wooden skewer upright into the hole to form a mast for your car's sail. Secure it at the base with plenty of tape. If it is still too wobbly, you can build a diagonal support out of a piece of cardboard.
11. Make at least three sails that are all the same shape but different sizes. For example, for rectangular sails, you could use a whole sheet of paper, a half sheet of paper, and a one-quarter of sheet of paper.
12. Now you have a sail car and sails that are ready to test out!

Procedure

- Poke the upright skewer through both ends of your smallest sail to hold it in place.
- Place your fan on the floor at one end of a long hallway or large room.
- Place your car in front of the fan and turn the fan on. *How far does your car go before it stops?*
- Replace the smallest sail with your next-biggest sail and try again. *How far does your car go this time?*
- Try with your largest sail. *Does the car go as far as you expected?*
- **Extra:** Try sails that are different shapes. *What shape works the best?*
- **Extra:** If you have a variable-speed fan, try the activity on different fan settings. *How does the fan speed affect how far or how fast your car goes?*

Balloon Races

<https://www.learner.org/series/project-playbook-educator-edition/balloon-race/>

[Watch the Video on this page](#)

MATERIALS NEEDED:

- Balloons
- Straws
- String
- Tape
- Your homemade vehicle

Get your kids in the competitive spirit and see who can build the best balloon vehicle. Have your students design a racer to attach to a balloon. Anything they can create is great, as funky as they want to be. We hope to see propeller planes and furry creatures.

OBJECTIVE: To be able to design a balloon-powered vehicle to study the motion of unbalanced and balanced forces.

DIRECTIONS:

1. Build the track by attaching a string to the wall with a thumbtack or tape. Hold the other end of the string and walk to the far side of the room.
2. Attach the straw and balloon to your racer.
3. Thread the end of the string through the straw.
4. After threading the string, inflate the balloon and, 3,2,1, LET GO!

FUN FACTS

Balloons were invented for military use and to conduct scientific experiments in the 1820.

When a balloon is popped, the noise it make is a sonic boom.

A 100-foot-diameter balloon can lift 33,000 pounds!