Summertime Science

Our hypothesis for this week? That your family will have a stupendous time with these silly science projects that get your child to balance rocks, blow bubbles, and launch marshmallows!

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WEEK 8: SUMMERTIME SCIENCE

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FUN THINGS WE'RE DOING

- ☐ Spud Launcher
- ☐ Square Bubbles
- ☐ Marshmallow Catapult
- ☐ Balancing Rocks: A Wobbly Game
- ☐ Sun-baked Cookies
- ☐ Tell Time by the Sun
- ☐ Melting Crayons
- ☐ Balloon Rocket Experiment
- ☐ Bubble Science

EXTRA CREDIT ADVENTURES

- ☐ Visit your local children's science museum and take a hands on approach to the subject; look online to find a great local kid's science center, like the Exploratorium in San Francisco or the St. Louis Science Center
- ☐ Take some time this week to explore scientific concepts in everyday life; pose questions to find out what is happening when water boils, when fireworks explode, or when ripe strawberries turn red. Make your hypotheses, then look up the answers online together

THINGS WE NEED

- ☐ 2-liter plastic soda bottle
- ☐ Baby shampoo
- ☐ Baking soda
- ☐ Beads
- ☐ Black construction paper
- ☐ Boxes: 1 shoebox; 2 cardboard boxes
- ☐ Bucket
- ☐ Clay
- ☐ Cookie dough
- ☐ Cooking thermometer
- ☐ Dish towel
- ☐ Drinking straws
- ☐ Glycerin
- ☐ Graph paper
- ☐ Large piece of glass
- ☐ Marshmallows
- ☐ Package of unflavored gelatin
- ☐ Plastic pipette
- ☐ Plastic spoons
- ☐ Potato
- ☐ Rocks (roughly the same size)
- ☐ Rubber Balloons
- ☐ Shallow baking dishes
- ☐ Small cookie sheet
- ☐ Water
- ☐ White vinegar
- ☐ Wooden board, at least 12 inches square
- ☐ Extra supplies: Ruler, rubber bands, scissors, bathroom tissue, dish soap, markers, craft knife, electrical tape, hole punch, pencils, notebook, aluminum foil, masking tape, string, hammer, nails, crayons, tacks, tape, timer, wax paper, binder clip, tape measurer

Is it Possible to Blow a Square Bubble?

You can huff and puff, but no matter how many times you blow a bubble, it always ends up round. This is because the molecules in the bubble mixture pull on each other, like a group of friends holding hands in a circle. The pulling means that you end up with a shape that has the smallest amount of surface area—a sphere.

Is there a way you can trick the natural forces that make bubbles *round* into making a bubble that's *square*? Let's find out!

Problem

Is it possible to blow a square bubble?

Materials

- 1/4 cup liquid dish soap
- 2 tablespoons glycerin
- 4 cups water
- Bucket
- 6 drinking straws
- Clay
- Plastic pipette

Procedure

1. Before you start, think about the liquid bubbles you always blow: What shapes are they? Think about the stick you dip into bubble solution to blow the bubbles. What shape is it? Write down any notes in your notebook.
2. Using your notes, guess if your attempts to blow a square-shaped bubble will work. Write this guess—called a **hypothesis**—in your notebook.
3. Fill the bucket with the liquid dish soap, glycerin and water, mixing the solution around gently with your hand.
4. Cut all of your straws in half. You should now have 12 mini-straws.
5. Assemble 4 pieces of straw into a square shape. Use a pinch of clay to keep the straws in place.
6. Repeat this with 4 additional pieces of straw so that you have two squares.
7. Use the 4 remaining pieces of straw and clay to join the two squares together; now you have a cube!
8. Cut the bulb end off the plastic pipette; this will be your bubble blower. If you don't have a pipette, use another plastic straw instead.
9. Head outside to start your bubble testing!
10. Carefully dip the straw cube into the container of bubble solution. Be sure the straw cube is completely covered with the bubble solution.
11. Gently lift the straw cube out of the bubble solution. Each part of the cube should now have a film of bubble solution inside of it.
12. Dip the pipette into the bubble solution.
13. Blow into the small end of the pipette to make a bubble come out of the larger end.
14. Gently place the bubble into the middle of your cube. This bubble will end up in the center of the cube.
15. Write or draw your **observations** (the things you see) in your notebook.

Results

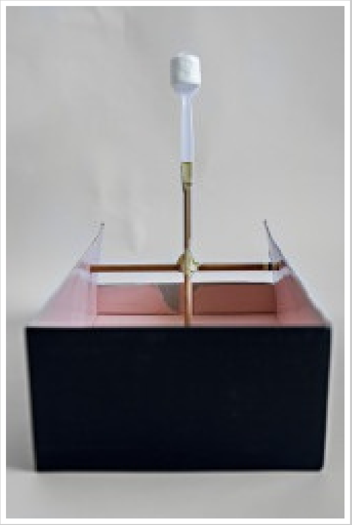
The bubble you blew and placed into the cube should have centered itself. The "side" bubbles in the straw cube should push against this "center" bubble, forcing it into a square shape. If you pop the side bubbles, the bubble in the middle will become round again.

Why

Bubbles are round because a sphere is the shape that is the most stable for them—a sphere is more stable than a square or a triangle or any other shape. But when a bubble is surrounded by other bubbles, these "side" bubbles push against the "center" bubble, squishing and squashing until it has corners and sides—like a cube! That's what happened to your bubble.

Now that you've made a cube-shaped bubble, keep the science going by trying your hand at different shapes. If you make a pyramid out of straws, can you end up with a triangular bubble in the middle? Can you make two or more bubble shapes by connecting straw cubes? How about if you don't cut the straws in half, and use whole straws to make a really huge straw cube? Do you end up with a really huge square bubble, or just a big mess? Guessing and testing is a big part of the scientific method, so write down what you think will happen and head back outside for more experiments.

Ready, Aim, Marshmallows!



Who says physics can't be fun? Science isn't ho hum anymore when it involves building a catapult to teach your child about projectile motion and potential energy. Help your fifth grader build a catapult from an ordinary shoe box and other easy-to-find materials around the home. This explosive—albeit yummy—project can be constructed indoors, so save it for a rainy winter afternoon!

What You Need:

- Narrow shoe box
- Ruler
- Marker
- Paper punch
- Craft knife
- Electrical tape
- 1-inch rubber band
- 3 pencils
- Plastic spoon
- Marshmallows

What You Do:

1. Help your child cut out one end of the shoe box, leaving a one-inch strip across the bottom.
2. Starting from that end, have your child mark a point one inch from the top and 2 ½ inches from the back of the box on one of the wide ends. Help your child use a hole punch or craft knife to punch a hole and enlarge it to the diameter of a pencil.
3. Repeat step 2 on the other wide side of the box. Insert a pencil through the holes, and help your child use a knife to poke a hole where the end of the pencil meets the bottom of the box.
4. Ask your child to use the electrical tape to fasten the spoon handle to the second pencil and cross this pencil to the first pencil, as shown in the picture.
5. Help thread the rubber band through the hole on the bottom of the box, putting the third pencil through the loop beneath the box to keep the rubber band from slipping through the hole. Inside the box, loop the rubber band over the end of the second pencil.

Catapults similar to this model were once used to launched rocks over castle walls. This one is perfect for flinging marshmallows at blocks or other light-weight targets. As your child pulls the spoon back, the rubber band stretches, storing potential energy. When released, the energy transfers to the marshmallow in the form of kinetic energy. Ready, aim, fire!

Balancing Rocks: A Wobbly Game

Did you know you can make a game out of a science experiment? Play with balance and simple engineering as you hurry to create a sturdy rock tower. It's you versus gravity (and a small fake earthquake or two), and only your skills with balancing rocks can deliver the win. What do you say -- are you game?

Problem:

What makes a balanced rock tower?

Materials:

- Rocks (roughly the same size)
- Notebook
- Pencil
- Small table
- Bubble level

Procedure:

1. Scout out the perfect work station. You want to find a flat, open space -- preferably a backyard or a patio.
2. Make sure the ground is flat by placing the bubble level on the ground. Are the bubbles in the middle of each liquid window? If so, then you're all set to go! If not, keep looking. This project requires a flat surface.
3. Set up your table on the ground.
4. Place your rocks on the table.
5. Think about the kinds of towers you want to try out. Do you want a narrow tower or one that is wide and squat? Can you think of a special building or a skyscraper that you would want your rock tower to look like?
6. What do you think will make the most balanced rock tower? Write your guess, sometimes called a **hypothesis**, in your notebook.
7. Build your first tower. Try experimenting with seeing how sturdy and how high you can make a tower that simply stacks one rock on top of the one beneath it.
8. Once you find a combination of rocks that seem to work, it's time for the earthquake! Set your timer and gently start shaking the table. How long does it take before the tower tumbles?
9. Record the time in your notebook.
10. Build your next tower. This time try forming a bigger **foundation**, or the lowest level of your tower. Group three or four rocks together and stop building from there.
11. Time your fake shaking of the table again and record the results in your notebook.
12. Make at least three more towers. Keep creating your fake earthquakes and make sure your write down all the times. Which towers did the best?

Results:

Rock towers that had sturdy foundations should have stayed up longer than towers balanced on only one rock. Generally, the bigger your foundation, the better your rock tower should have been.

Why?

The reason some of your towers did better than others probably had a lot to do with **points of contact**, or the areas on an object that touch another object. You can use your hands to understand points of contact. Press your palms together. What areas on each hand are touching? Probably some of the first points of contact you identified were your fingers. Now relate this to your rocks: the towers with bigger foundations had more points of contact. Lots of points help buildings become sturdier, and sturdy buildings don't fall (unless you shook your table *really* hard).

What other wobbly games can you experiment with? Try making a rock bridge or a rock house that can ride out a fake earthquake. Can you find other things that affect balancing besides points of contact? What about the size of the rocks or the number of rocks you use? Keep guessing, testing and balancing rocks! Real scientists don't just do one experiment and stop -- they keep experimenting and learning every day.

Can You Cook Using Only Sunlight?

Grade Level: 7th to 11th; **Type:** Meteorology, Physics

Objective:

Bake cookies with an oven that collects sunlight and traps heat.

Research Questions:

- How can I cook using just sunlight?

Make an oven that collects sunlight and traps the shorter wavelengths (heat!) inside the same way greenhouse gases in our atmosphere trap them, and bake some cookies!

Materials:

- Two cardboard boxes: one must fit completely inside the other with about an inch or two to spare, and the outer one must have flaps (or you can create and attach some)
- Roll of aluminum foil
- Masking tape
- Four 12-inch pieces of string
- Eight beads or pieces of macaroni
- Pencil
- Piece of black construction paper
- Scissors
- Scrunched-up shredded paper
- Piece of glass, large enough to completely cover the smaller box but small enough to fit inside the larger one
- Cooking thermometer
- Small cookie sheet or pie tin (must fit inside smaller box; make your own with some of the foil if necessary)
- Prepared cookie dough (commercial or homemade) that bakes at 350° or under warm, sunny day

Experimental Procedure:

1. Cover the insides of the flaps of the larger box with aluminum foil, with the shiny side facing out; tape the foil in place. Use the pencil to poke small holes in the edges of the flaps.
2. Tie a bead to one end of one of the pieces of string, string it through one of the holes in one of the flaps so that the bead ends up on the outside of the flap, string it through the hole in the next flap over from the inner side to the outer, and tie another bead to this end of the string. Repeat so that all four flaps are connected together with the strings.
3. Line the entire inside of the smaller box with foil, shiny side out, taping it in place.
4. Cut the piece of construction paper so that it fits neatly inside the smaller box; tape it inside the bottom of the box.
5. Put enough shredded paper inside the larger box so that when you rest the smaller box on it, the opening is just barely below the opening of the big box.
6. Center the little box and pack the space between the walls of the big box and the walls of the little box with more shredded paper.
7. Put the cooking thermometer and some of the cookies on the baking sheet (you may need to grease it first: check the instructions/recipe) and set it inside the inner box; cover the inner box with

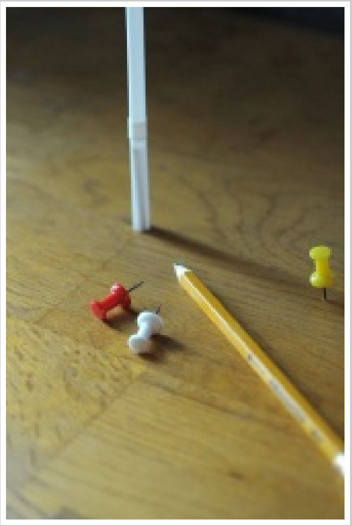
the pane of glass. Your solar oven is ready to go!

8. Take the oven outside and set it in a bright, sunny spot where it won't be disturbed. Turn it so that the sun shines directly into it; if the sun isn't pretty close to directly overhead, you might want to put something under one side of the box to tip it to face the sun. Use the strings to adjust the flaps so that as much sunlight as possible is reflected into the inside of the oven.
9. Now you wait. I hope you brought a good book! Depending on the time of day and how warm it is outside, you may need to turn the oven or even move it to a new spot so that it gets as much sunlight in it as possible.
10. Keep an eye on the cooking thermometer. You'll notice that it gets much hotter inside the oven than it is outside. That's partly because the aluminum foil is focusing the solar radiation, and partly because the glass is acting like a layer of greenhouse gases: like them, it's clear, but some of the shorter wavelengths will bounce off of it and tend to stay inside the oven, making things hotter and hotter inside. It may get as hot as 350° Fahrenheit in there!
11. When the cookies look like they're about done (they'll probably be browning around the edges and won't be shiny anymore), or when the thermometer reads a temperature higher than they're supposed to cook at, whichever comes first, take the glass off and let the inside of the oven cool for a few minutes. When the cookie sheet isn't too hot to touch anymore, lift it out and try a cookie!

Terms/Concepts: solar radiation, greenhouse gases

Return to Summer Learning Adventures.

How to Tell Time by the Sun



Have you ever noticed how the Sun moves across the sky during the day? It rises in the East and reaches its highest point in the sky around lunchtime. Then, it descends, setting in the West. Although it is hard to believe, it is actually we on Earth who are travelling—not the Sun!

The Sun sits in the middle of our solar system. Our Earth **revolves,** or orbits, around the sun. That means the Earth orbits around the Sun. It takes one full year for the Earth to go around the Sun once. The Earth also **rotates**, or spins around. It takes one full day for the Earth to rotate around once. The parts of the Earth facing the sun experience day, and the parts of the Earth facing away from the Sun experience night. It's because of this rotation that the Sun appears to travel across the sky.

People didn't always have watches or (or cell phones) to tell what time it was. Thousands of years ago, early civilizations invented **sundials**, devices which use the apparent movement of the Sun to determine how much time has passed. In this activity, you will construct a sundial and revisit it throughout the year to see how the revolution of the Earth affects what time the sundial shows.

Problem: Why does a sundial's position change throughout the year?

Materials

- A long sunny, summer day to start your project on (a day in late August would still work)
- Wooden board, at least 12 inches square
- Hammer
- Nail
- Scissors
- Plastic straw
- Watch
- Ruler
- Tacks
- Pencil
- Permanent marker

Procedure

1. Hammer a nail ¼ inch into the center of the board. *Why do you think it's a good idea to make a sundial out of wood and nails rather than a paper plate?*
2. Cut the straw to a length of six inches.
3. Place your straw over the nail.
4. In the morning, find a bright, level space outside and set the board on the ground at the top of the hour. Make sure no other shadows (from things like trees) will cover your sundial later in the day.
5. Observe the end of the nail's shadow. Use the pencil to mark the shadow's end, and gently push a tack into this part of the board to mark this location.
6. Write the hour next to the mark indicating the end of the shadow.
7. Make sure the sundial will not be disturbed the rest of the day. If it gets moved, your measurements will become inaccurate!
8. Visit the sundial again at the top of the next hour, again placing a tack and noting the hour with a pencil.

9. Continue visiting the sundial every hour until sundown, placing a tack and marking.
10. If your sundial was not disturbed and you are happy with your marks, replace the pencil numbers with numbers written in permanent marker.
11. Get to know your sundial the next couple days. *In what conditions can't you use it*?
12. Use your sundial on several days throughout the year (make sure your sundial faces the same direction each time you use it! For best results, never move your sun dial). This table includes some suggestions, rather than specific dates, since you can only use your sundial on sunny days. In the observations column, note how the shadows and hours varied from the previous readings.

Date	Observations
Early October	
Mid December	
Early February	
Late March	
Mid May	

Results

Your results will vary depending on where you live, and particularly on your location's latitude (if you live in the Southern hemisphere, your results over the months will be the opposite what we describe next)! The shadow of the nail will move in a semi-circular pattern throughout the course of the day. The height of the nail's shadow will be longest in the early and late part of the day, and shortest in the middle of the day. As you observe the sundial over the course of the school year, the nail's shadow will get longer until December, and the sun might set before you can complete some readings! If your state observes Daylight Saving Time, your sundial will be an hour off during the winter. As spring approaches, the shadows on your sundial will shorten, and your results should begin to resemble your observations in August.

Why?

You made your sundial out of wood and a nail to ensure that the wind wouldn't blow it over and make your readings inaccurate. You can only use a sundial if the sun is shining.

Your sundial works as a clock because the Earth rotates. As the Earth spins, the Sun seems to move across the sky. When the sun appears over the horizon at dawn, its light strikes the nail from the side, making a long shadow. As your part of the Earth continues to rotate, the Sun gets higher in the sky. The Sun's light strikes the nail from above, making shorter shadows from 11 to 1. As the part of the Earth where you live rotates away from the Sun, it seems to sink in the sky, and the nail shadows again get longer.

When you looked at the sundial in December, the nail shadows were longer and the day was shorter because the Earth had reached a certain position in its path around the Sun. In this position, the Northern hemisphere is tilted away from the sun, making its light less direct. Because you turned the clocks back at the end of Daylight Saving Time in late October, your sundial was ahead by an hour for the winter: You created the sundial using a clock on daylight savings in August. In spring, when clocks are returned to daylight savings, your sundial will again match your watch. By May, the day will be longer and the nail's shadow shorter, because the Earth continued to revolve around the Sun, and the Northern hemisphere returns to a position where the Sun's light is more direct.

Going Further

Research what ancient sundials looked like. You might also investigate how different civilizations determined how to tell time by the sun. The Mayan pyramid at Chichen Itza is particularly interesting.

Melting Crayons

If you think you've outgrown crayons, you're probably wrong. The beloved art tools aren't just good for creating colorful masterpieces -- they're also great for science. Using an oven and some old crayons, you can actually test how color affects melting times. It's a simple and creative project that also ends with a waxy, splattered piece of art!

Problem:

What will melt faster, a black crayon or a yellow crayon?

Materials:

- Black crayons
- Yellow crayons
- Cookie sheet
- Wax paper
- Timer
- Pencil
- Notebook
- Adult
- Oven
- Oven mitt

Procedure:

1. Have an adult help you preheat the oven to 230 degrees.
2. Lay a wax paper over the cookie sheet.
3. Dump your crayons on the cookie sheet. You should have at least three black crayons and three yellow crayons.
4. Separate the colors so that none of the black crayons are touching the yellow crayons.
5. When then oven is ready, place the cookie sheet on the center rack.
6. Start your timer.
7. While you wait, think about the question of this project: do you think the black or the yellow crayon will melt the fastest? Or, do you think both colors will start melting at the same time?
8. Write down your best guess, or **hypothesis**, in your notebook.
9. Keep checking the crayons to see which crayons are melting the fastest.
10. Record in your notebook the time at which each color began to melt.
11. When every color group has melted, have an adult help you use an oven mitt to remove the cookie sheet from the oven. (Don't be too quick to throw away the wax paper and crayon puddles! Once the crayon wax hardens, you can display it as nifty-looking evidence of your project.)
12. Review your notes. Did all the colors melt at the same time? Was your hypothesis correct?

Results:

The black crayons should have melted much sooner than the yellow crayons.

Why?

Color makes a big difference. The **pigments,** which give each crayon its color, don't react the same way to heat. Black crayons melted the faster because of it has dark pigments while yellow crayons melt slowly because of the light pigments.

Do you think you can only see these pigments at work with black and yellow crayons? Try this same experiment with the other colors in your crayon box! Can you predict the order that the colors of the rainbow -- red, orange, yellow, green, blue, indigo and violet -- will melt in?

Balloon Rocket Experiment

You need to send a message to home from your tree house, but it’s too windy to send a paper airplane! Fortunately, you have a taut clothesline and a supply of balloons from last week’s birthday party. How can you make a balloon rocket, and how can you make it travel as far as possible?

Problem:

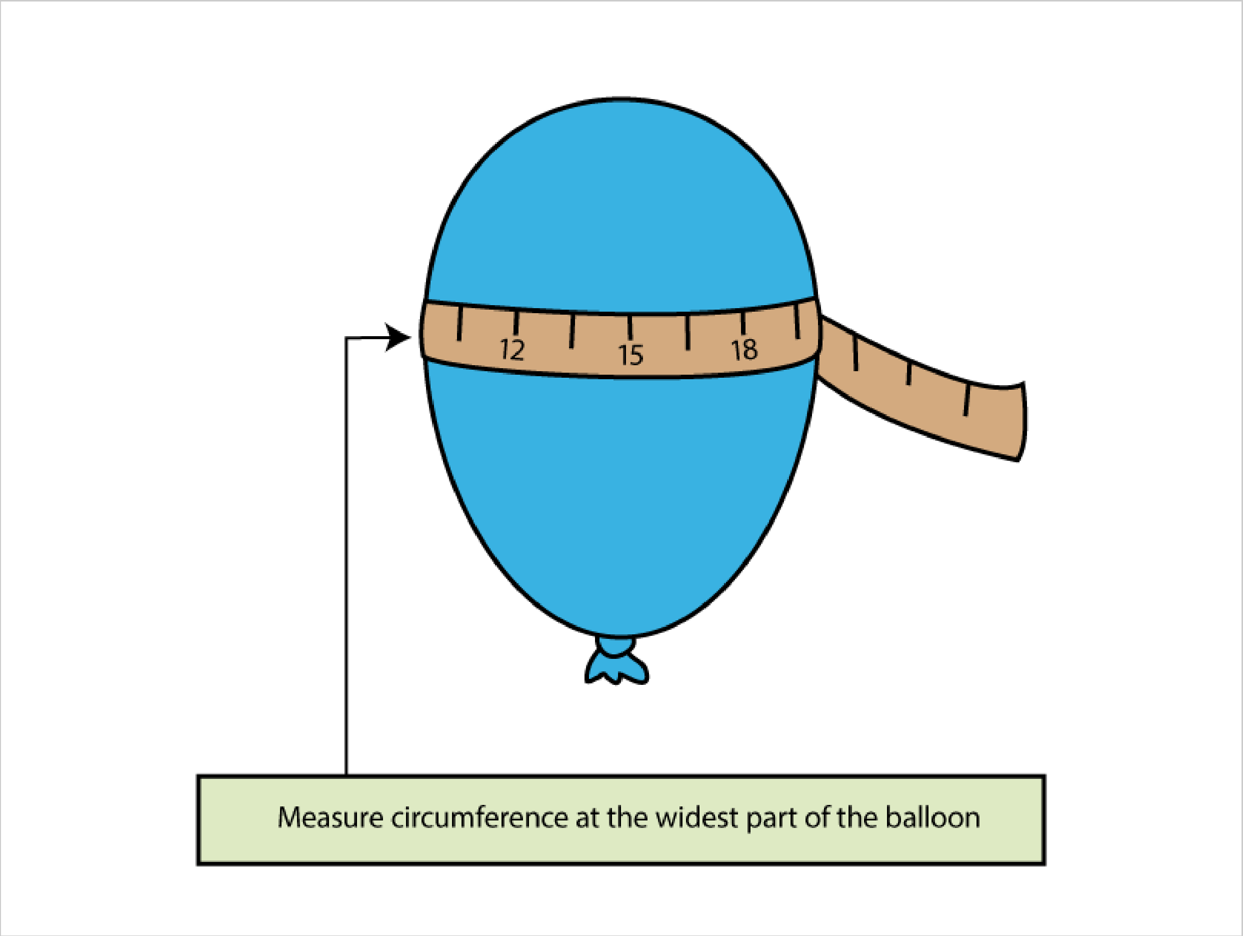
How does the volume of air in a balloon affect the distance it travels?

Materials:

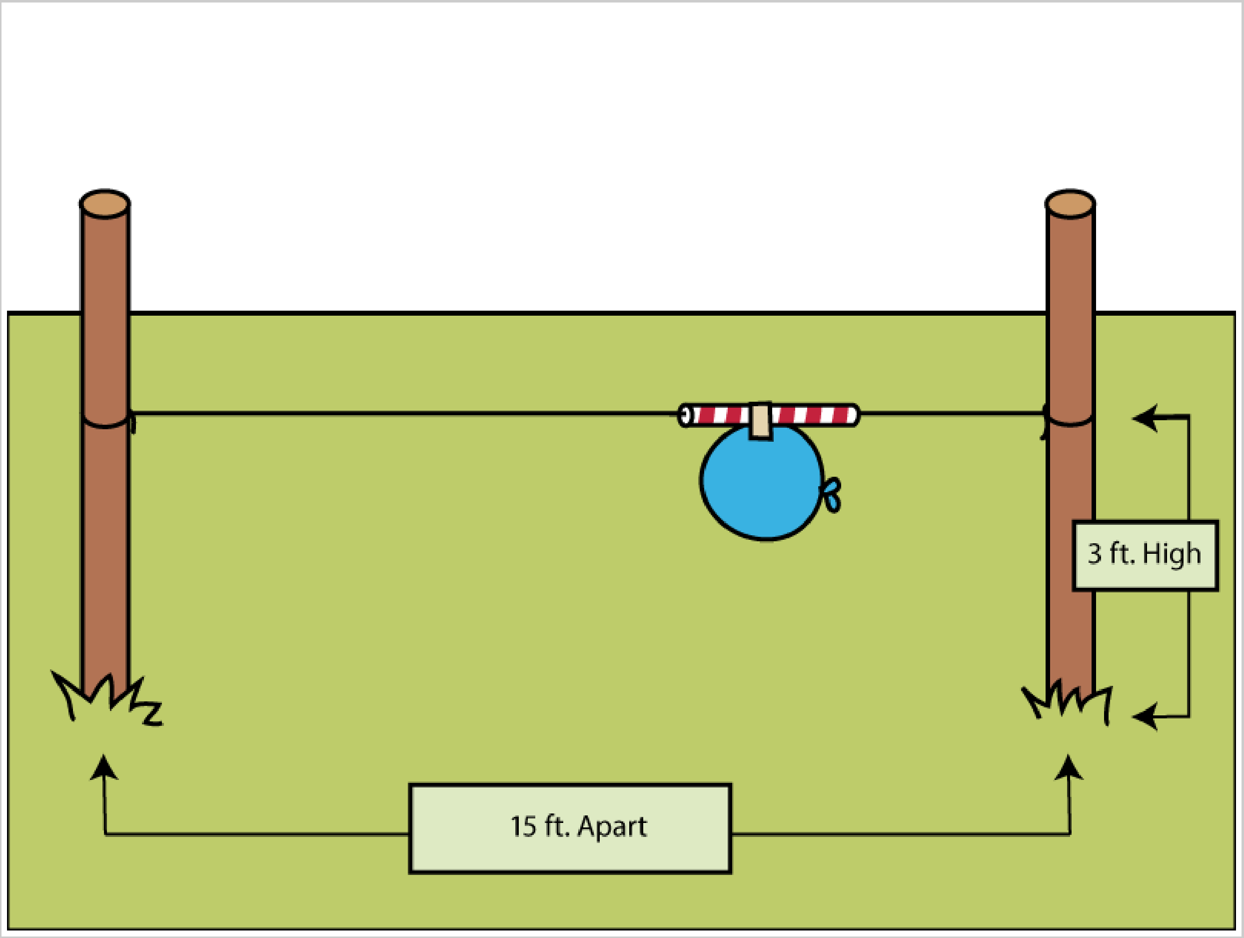
- Rubber Balloons
- Binder clip
- String or Thin Rope
- Straws
- Tape
- Cloth Tape Measure
- Two Posts (At least three feet tall and fifteen feet apart)
- Paper
- Pencil
- Graph paper
- Helper

Procedure:

1. Tie the string or rope to one of the posts at the height of at least three feet. Leave the other end loose.
2. Cut some straws into lengths that will fit on your balloon. One third of a straw is usually a good length.
3. Inflate a balloon and seal the air inside by folding the neck over once and clamping it shut with a binder clip.
4. Measure and record your balloon’s circumference by wrapping your tape measure around the balloon’s widest point. You might need your helper to lend a hand:



4. Keeping the balloon’s opening shut, tape a straw to your inflated balloon. Make sure the straw and the nozzle of the balloon are parallel to each other.
5. Thread the loose end of your string through the straw so that the neck of the balloon is facing towards you.
6. Pull your string taut and line it up with your second post. Measure a point off the ground that’s the same height as the knot holding the other end of the string to the first post. Be sure to hold the string at this height whenever you’re conducting a balloon launching trial. *Why do you think holding your end of the string at the same height is important?*



7. Count down to zero, and let the rocket fly! Have your helper use the tape measure to measure and record the point on the string at which the balloon stopped.
8. Repeat steps 5-8 with two more balloons inflated to the same circumference as your first balloon.
9. Average the distance traveled for all three trials.
10. Repeat steps 5-10 with three balloons inflated to a circumference 5cm greater than your first balloons were.
11. Keep conducting trials using balloons inflated to progressively bigger circumferences. You can use a table like this as a guide:

	20cm	**25cm**	**30cm**	**35cm**	**40cm**	**45cm**
Trial 1						
Trial 2						
Trial 3						
Average						

13. Using a sheet of graph paper, plot your trials on a line graph. The x axis should be circumference in centimeters. The y axis should be distance travelled in feet.
14. Look at your graph. *What is it telling you?*

Results:

If you had a large enough difference between your smallest and largest circumferences, you should see the average distance traveled go up very quickly as the balloon’s circumference increases.

Why?

All rockets work by shoving gas out of their nozzles really rapidly. This pushes the rest of the rocket in the other direction, as predicted by Newton’s Third Law: “For every action there is an equal and opposite reaction.” What this means is when you push on something, it pushes back on you just as hard. You might then think “Why don’t I fly all over the place when I push on something or throw a ball?” The main reason you don’t go flying like your ball is because you weigh more than it does. Even if the ball pushes back on you with the same amount of force that you apply to it, you’re a whole lot harder to move!

The bigger balloons move farther because they can push more air. While all of your balloons pushed air out at roughly the same speed, the bigger balloons had more “fuel,” allowing them to exert force for a longer period of time.

It’s not too hard to calculate the amount of air in each of your balloons. This equation will help:

$$\frac{\text{Circumference}^{3}}{6\pi^{2}} = \text{Volume of Air}$$

Another cool thing is that the direction of the push matters quite a bit. Try taping your balloon so that its nozzle points to the side a little instead of straight along the straw. What happens? Can you match a bigger balloon and a smaller balloon together so that they don’t go anywhere when you let them loose? Space stations use this principle to turn end over end, spin, or even move sideways. It’s the only way they can change what direction they’re pointing, because they don’t have anything else to push off of.

Bubble Science

There’s a fantastic place way up in Vancouver, Canada called Science World. And we heard a rumor that they had the thickest, bounciest bubbles around. So we asked them how they did it. Here are their recipes for bubbles that not only blow up nice and big, but do tricks and experiments! How do they do it? It’s not a secret, it’s science!

What You Need:

- Water
- Baby shampoo
- Package of unflavored gelatin (ex. Knox brand)
- Glycerin (you can get this at most pharmacies, all you need is a small bottle)
- Shallow baking dishes
- Bubble-blowing materials, such as drinking straws, funnels, wire hangers etc.
- Food coloring (optional)
- Printable scenes for doing colored bubble art

What You Do:

1. Mix your bubble solution! You can just try out one at a time, or make them all at once and compare the different solutions!
   - To make **All Purpose Bubble Solution**, gently mix one part water to one part baby shampoo, and let the solution stand for a few hours. This solution is great for most bubble tricks, activities and experiments
   - To make **Bouncy Bubble Solution**, Dissolve one package unflavored gelatin into one cup of hot water (just boiled). Then add 1.5 - 2 ounces (50-70 ml) glycerin, and 8.5 ounces (250 ml) baby shampoo. Stir gently. The solution will gel as it cools. Reheat it carefully in the microwave (about two minutes). Bubbles made with this solution will bounce off your clothes!
   - To make **Thick Bubble Solution**, mix 3 partsbaby shampoo to 1 part water. When you make a bubble with this solution, try puffing at it to make a bubble inside a bubble.
   - To make **Colorful Bubble Solution**, mix your choice of food coloring with the All Purpose Bubble Solution.
2. Once your solution is all mixed, put it in shallow baking dishes and get ready to experiment! Put a bunch of materials out so your child can try a variety of different tools, and make predictions about which will blow the best bubbles. Funnels, drinking straws, wire hangers bent into loops, pipe cleaners, all of these things work well. For a humongous bubble blower, thread a piece of string through two drinking straws and tie the ends together. Challenge your child to come up with his own ideas, too.
3. To make an art project out of this experiment, cut out a large shape (flower, animal, etc.) out of a piece of white poster board, blow the colored bubbles, and then “catch” them on the paper to make a neat picture. If you don't have time to cut up poster board, print out our Bubble Art Printables and use them to create your colored bubble art!

Once everyone's experimented with all the materials, have everyone grab his or her favorite blowing tool and see who can blow the weirdest bubble!

Excluded Items

These items cannot be added to your booklet due to publisher restrictions. However, you can print them out individually by going to the pages directly.

Spud Launcher: What Happens when Magma Hardens Inside a Volcano?
What happens when magma hardens inside a volcano? This fizzy and explosive science project gets your child to see what happens when pressure builds ...
http://www.education.com/science-fair/article/spud-launcher/

education.com