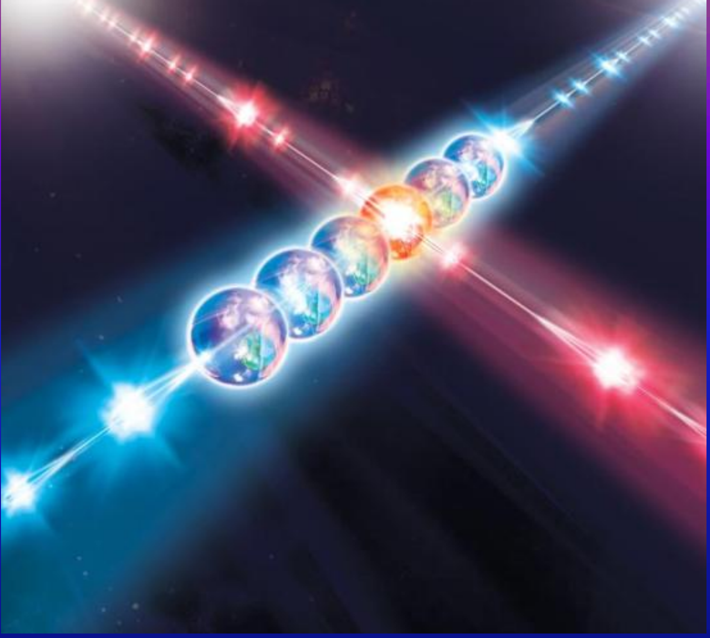

# Science Activity & Video Series

# Volume 6

Includes detailed project steps, explanations and key concepts, tips & tricks, and access to instructional videos.

Designed by real scientists for our future generation.

*A collection of quick and inexpensive science experiments that work you through electricity, introduce you to chemistry, and present project ideas guaranteed to get your kids excited to do real science.*

Supercharged Science

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**Thank You for purchasing the *Homeschool Science Activity & Video Series.***

I hope you will find it to be both helpful and insightful in sparking young minds in the field of science!

# INTRODUCTION

**Do you remember your first experience with *real* science?** The thrill when something you built yourself actually *worked*? Can you recall a teacher that made a difference for you that changed your life?

**First, let me thank you** for caring enough about your child to be a homeschool parent. As you know, this is a huge commitment. While, you may not always get the credit you deserve, never doubt that it really does make a difference.

**This book has free videos that go with it** to show you step-by-step how to do each experiment. You can view the videos at: [SuperchargedScience.com/savs6.htm](SuperchargedScience.com/savs6.htm)

**Access code: ESCI**

Go to this page now so you can get a preview of the videos.

**Think of this activity book as** the "Idea Book", meaning that when you see an experiment you really like, just take it and run (along with all its variations).

For example, if you find yourself drawn to measuring the width of a hair using a laser, our ideas are just the beginning. Try measuring the track spacing on a CD, the size of bacteria, and so forth. Does the color of the laser matter?

**A Word About Safety…** make sure you work with someone experienced when you're working with new stuff you're unsure about. Just use common sense—If it seems like it could be dangerous, ask for help.

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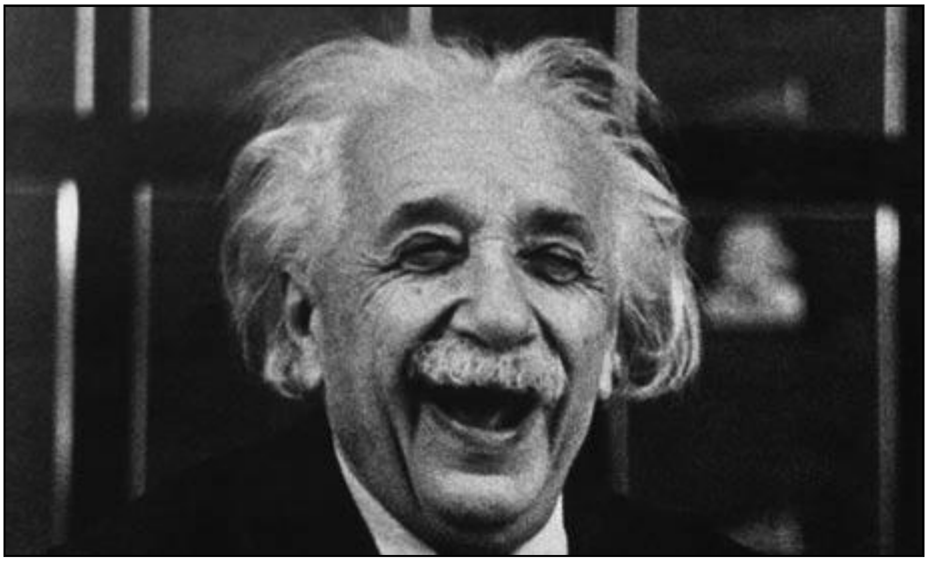
*"Imagination is more important than knowledge. For knowledge is limited to all we now know and understand, while imagination embraces the entire world, and all there ever will be to know and understand."*

*~Albert Einstein*



# Silverware Battery

## Activity

We'll be using chemistry and electricity together (electrochemistry) to make a battery that reverses the chemical reaction that puts tarnish on grandma's good silver. It's safe, simple, and just needs a grown-up to help with the stove.

## Materials

- stove (with adult help)
- skillet
- aluminum foil
- water
- baking soda
- Salt
- real silverware (not stainless)

## Always wear your safety goggles and gloves.

## Experiment

**To start with, watch the video** for this experiment:

SuperchargedScience.com/savs6.htm

**Access code: ESCI**

You can safely dip it into a self-polishing solution.

1. Line your skillet with aluminum foil.
2. Add one to two cups of water to your skillet (depending on the size of your pan.)
3. Add a teaspoon of salt.
4. Add 1 teaspoon baking soda.
5. When your solution bubbles, place the tarnished silverware directly on the foil. Start with a small, really tarnished piece so you can see the cleaning effects the best.
6. Use tongs to flip it over. This reaction happens quickly.
7. Only the parts touching the foil will get cleaned, so you'll want to move the foil around (or add more) so it comes in good contact with the silver.
8. Lift out the silverware, run under cool water, and wipe dry.
9. Toss the foil in the trash (or recycling) when you're done, and the liquids go down the drain with plenty of water.

Never polish your tarnished silver-plated silverware again! You can set up a 'silverware carwash' where you earn a nickel for every piece you clean. (Just don't let grandma in on your little secret!)

## What's Going On?

This is a very simple battery, believe it or not! The foil is the negative charge, the silverware is the positive, and the water-salt-baking-soda solution is the electrolyte.

Your silver turns black because of the presence of sulfur in food. Here's how the cleaning works:

The tarnished fork (silver sulfide) combines with some of the chemicals in the water solution to break apart into sulfur (which gets deposited on the foil) and silver (which goes back onto the fork).

Using electricity, you've just relocated the tarnish from the fork to the foil. Just rinse clean and wipe dry.

Want to know more about the science behind this experiment? Here it is:

When electric current passes through a material, it does so by electrical conduction. There are different kinds of conduction, such as metallic conduction, where electrons flow through a conductor (like metal) and electrolysis, where charged atoms (called ions) flow through liquids.

When an atom (like hydrogen) or molecule (like water) loses an electron (negative charge), it becomes an ion and takes on a positive charge.

When an atom (or molecule) gains an electron, it becomes a negative ion. An electrolyte is any substance (like salt) that becomes a conductor of electricity when dissolved in a solvent (like water).

This type of conductor is called an "ionic conductor" because once the salt is in the water; it helps along the flow of electrons from one clip lead terminal to the other so that there is a continuous flow of electricity.

## Questions to Ask

1. Where is the electrolyte in this experiment?
2. Where does the black stuff that was originally on the silverware go?
3. Where's the electricity in this experiment?
4. Where would you place your digital multimeter probes to measure the generated voltage?


## The Digital Multimeter

A DMM (Digital Multi-Meter) or DVOM (Digital Voltage Ohm Meter) is a handheld device that scientists pull out when things go wrong. This handy tool can detect problems with electronics, motor controls, appliances, power supplies, and circuits in no time.

It's not enough to know how to use the buttons and dial. You also have to know how to test your circuit and find out where the trouble is. This is one of the most important tools in a scientist's toolbox.

The first device to detect current was a galvanometer (we're making one of these later on) way back in 1820.

It wasn't until the 1920s when vacuum-tube electronics were common that the first multimeter was invented by an upset engineer who was frustrated that he had to carry around so many different devices to do his job maintaining telecommunication circuits with the British Post Office.

# EDDY CURRENTS

## Activity

Eddy currents defy gravity and let you float a magnet in midair. Think of eddy currents as brakes for magnets.

Roller coasters use them to slow down fast-moving cars on tracks and in free-fall elevator-type rides.

## Materials

- Neodymium magnets
- Copper pipe
- Plastic, wood, and aluminum metal sheets
- Stopwatch or timer

## Experiment

**To start with, watch the first video** for this experiment at:

SuperchargedScience.com/savs6.htm

**Access code: ESCI**

1. Make a ramp from a plastic sheet (like a cutting board, or whatever you have around) by propping up one end.

2. Place the magnets at the top. How long do you think it will take for the magnets to reach the bottom?

3. Write your guess here:______________

4. Now release the magnets, timing how long it takes to reach the bottom. Write your answer here:_______________

5. Make a wood ramp, like a wood cutting board or even a coffee table that you can raise one end so it's higher than the other. How long do you think it will take your magnets to reach the bottom? Write your guess here:_____________

6. Release the magnets again and write your answer here from your stopwatch timer:_____________

7. If you have a cookie sheet, it's probably steel, so prop one end up to form a ramp and place the magnets at the top. What happened?

   ___________________

8. Take your aluminum sheet and lift up one end. Place your magnets at the top of the ramp and let go. What happened? Repeat this experiment and this time, use your stopwatch to time how long it takes for the magnets to reach the bottom:

   ____________________

9. Now try something else: take a non-magnetized object, like a nail or pencil and slide it down the metal ramp. Did they slide down faster or slower than the magnets?

   __________________

10. Grab your copper pipe and stand it on end. Place your magnets at

the top and get your stopwatch ready.

11. Release the magnets inside the pipe and release them, timing how long it takes for them to reach the bottom. Was it faster or slower than the aluminum metal plate? Write the time you measured here:_______________

## What's Going On?

If this experiment has you scratching your head in confusion, here's the basic idea about the science behind this effect (which is actually quite complicated!)

When a magnet moves near an object that conducts electricity (usually metal), it creates electric currents called *eddy currents* which start to flow in the conductor.

These eddy currents create magnetic fields in the opposite direction of the moving magnet, slowing an object down so it appears to float down the ramp slowly.

Eddy currents are brakes for moving magnets!

## Questions to Ask:

1. What is the average speed of your fastest magnet?
2. What makes the magnet slow down the most? Is it the size of the magnet, the strength of the magnet, number of magnets, or something else?
3. What if you stack two aluminum plates on top of each other and use this for a ramp? How would this affect your data?
4. Does the angle of the ramp matter?

## What IS Science?

Science is more than a classroom… it's actually pretty difficult to define. Science is not about what we know, but rather about how we face what we *don't* know.

It's not a textbook of principles, set of rules, or collection of factoids. It's a process, a *thing* you do.

Science is what happens when you ask questions, get back answers, and try to figure out and make sense of it all. There are many different ways to do this, the *Scientific Method* is only one of the ways of sorting and sifting through the information as you go along.

Believe it or not, there's a straightforward method to doing science. You can't just sit around and argue about how things work, but you actually have to do experiments and be able to measure your results.

And other people have to be able to get those same results on their own, too!

Learn more about how to do real science with the e-Science Online Program: www.SuperchargedScience.com

# Graphical Multiplication

## Activity

The trick looks impressive, so be prepared for jaw-drops when you show this to kids and adults. But can you figure out how it works? I'll give you a hint: think about how to represent placeholders of powers of 10...

## Materials

- Paper
- pencil

## Experiment

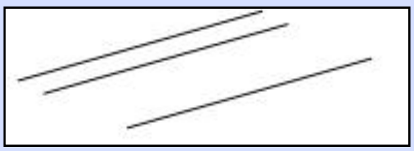
**To start with, watch the video** for this experiment:

[SuperchargedScience.com/savs6.htm](SuperchargedScience.com/savs6.htm)

**Access code: ESCI**

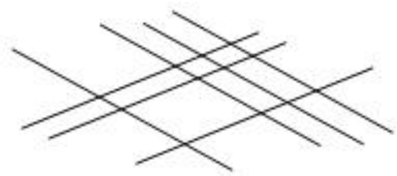
1. We want to figure out the solution this problem: 21 x 13 = ?

2. For 21, we draw two lines for the tens' place value followed by 1 line for the one's place value:

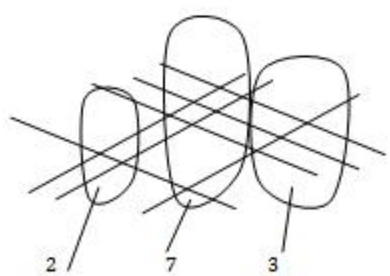


The then draw lines that represent 13 like this:

But place those on top of the original lines for the 12, so it really looks like this:



Now group the intersections (where the lines cross each other) and count them up like this:



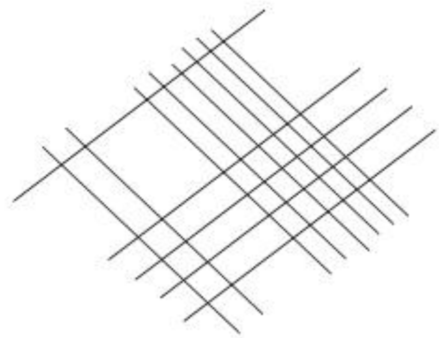

The answer to the problem magically appears as 273!

So 21 x 13 = 273.

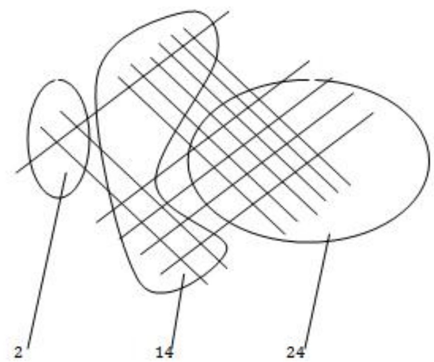
Let's try another problem, only this time the numbers are larger. Here's the problem:

What is 14 x 26?

First, draw the lines for 14 and 26 like this:



Now group the intersections together like this and count them up:




Uh-oh! Did you notice that there are double-digits in our answer? Some of the numbers of intersections we counted up greater than 9! It turns out that we have to carry part of that number over to the next level.

I mean, it's ridiculous to come up with the answer that 14 x 26 = 21,424! Since 10 x 30 = 300, we know the answer has to have three digits, not five.

So here's how we handle this:

The "2" from the "24" gets added to the "4" from the "14", making it an "6".

The "1" from the "14" gets added to the "2" on the leftmost section of intersections, so your final number is 364.

## What's Going On?

For the first example, we represented the number 21 with a set of two lines and then with one line.

Then we turned 90 degrees and added the number 13 on top by drawing one line followed by a set of three lines.

But what do the lines really mean?

Remember my hint about placeholders? Well, the lines are really placeholders for the following multiplication:

21 x 13 = (2x10 + 1)(1x10 + 3)

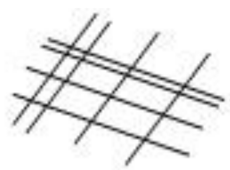
Instead of writing out the numbers like the problem above, we simply draw lines to mean the same thing. If you were to cross-multiply that problem, we get a scary thing that looks like this when we group it in powers of ten:

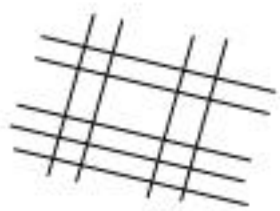
(2x10 + 1)(1x10 + 3)= $2*10^2$ + (2×3 +1)x10 + 3 = 273

The answer of 273 comes from figuring out there are 2 units of 100 (or $10^2$), 7 units of 10, and 3 units of 1. Those are the intersection points of the lines we drew.

## Questions to Ask:

1. 23 x 45
2. 56 x 72
3. 52 x 26
4. 62 x 49
5. 67 x 92
6. What are the equations and answers to the following diagrams?





## What is Math?

Math can be compared to a very useful tool, like a hammer, or a collection of tools like a set of screwdrivers.

A lot of kids get frustrated and bored with math, because many textbooks concentrate a lot on teaching the small, meticulous details of each and every type of tool. That's one of the fastest ways to kill your passion for something that could have otherwise been really useful!

Don't get me wrong – you do need to know how to tell a hammer apart from a screwdriver. But can you tell me *when* to use the hammer instead of the screwdriver?

It's really important to focus on how and when to use the different tools. This is my practical approach to teaching the subject.

Most kids think math just means numbers, when the truth is that math is much more than just numbers and being good at multiplying!

There are three main areas in math (at least when you first start out). Some kids enjoy adding and dividing, and for them, math is all about numbers. However, if you're really good with shapes and how they relate, then you might enjoy geometry. And if you are good at solving puzzles and people think you're unbeatable at certain games, chances are that logic will be a great match for your skills.

# Laser Measurements

## Activity

Do you have thick or thin hair? Let's find out using a laser to measure the width of your hair and a little knowledge about diffraction properties of light.

## Materials

- a strand of hair
- laser pointer
- tape
- calculator
- ruler
- Paper
- clothespin

**WARNING!** The beam of laser pointers is so concentrated that it can cause real damage to your retina if you look into the beam either directly or by reflection from a shiny object. Do NOT shine them at others or yourself.

## Experiment

**To start with, watch the video** for this experiment:

SuperchargedScience.com/savs6.htm

**Access code: ESCI**

1. Tape the hair across the open end of the laser pointer (the side where the beam emits from)

2. Measure 1 meter (3.28 feet) from the wall and put your laser right at the 1 meter mark.

3. Clip the clothespin onto the laser so that it keeps the laser on.

4. Where the mark shows up on the wall, tape a sheet of paper.

5. Mark on the sheet of paper the distance between the first two black lines on either side of the center of the beam.

6. Use your ruler to measure (in centimeters) to measure the distance between the two marks you made on the paper. Convert your number from centimeters to meters (For me, 8 cm = 0.08 meters.)
7. Read the wavelength from your laser and write it down. It will be in "nm" for nanometers. My laser was 650 nm, which means 0.000 000 650 meters.

8. Calculate the hair width by multiplying the laser wavelength by the distance to the wall (1 meter), and divide that number by the distance between the dark lines. Multiply your answer by 2 to get your final answer.

Here's the equation:

Hair width = [(Laser Wavelength) x (Distance to Wall)] / [ (Distance between dark lines) x 0.5 ]

In the video, the wavelength was 650 nm = 0.000 000 650 meters. The distance from the wall was 1 meter. The distance between the dark lines was 8 cm = 0.08 m

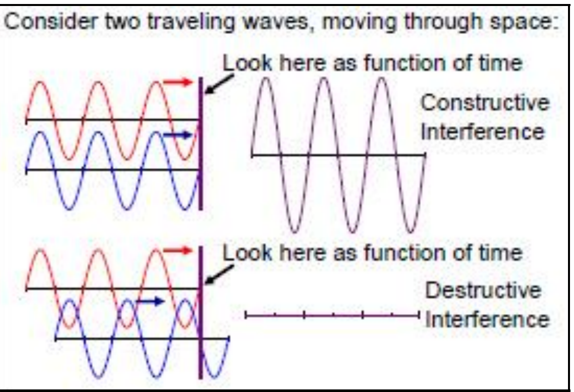
Using a calculator, this gives a hair width of 0.000 0162 5meters, or 16.25 micrometers (or 0.000 629 921 26 inches).

## What's Going On?

Light is also called "electromagnetic radiation", and it can move through space as a wave, which makes it possible for light to interact in surprising ways through interference and diffraction. This is especially amazing to watch when we use a concentrated beam of light, like a laser.

If we shine a flashlight on the wall, you'll see the flashlight doesn't light up the wall evenly. In fact, you'll probably see lots of light with a scattering of dark spots, showing some parts of the wall more illuminated than the rest. What happens if you shine a laser on the wall? You'll see a single dot on the wall.

In this experiment, we used a laser to discover how interference and diffraction work. We can use diffraction to accurately measure very small objects, like the spacing between tracks on a CD, the size of bacteria, and also the thickness of human hair.




The image (above) shows how two different waves of light interact with each other. When a single light wave hits a wall, it shows up as a bright spot (you wouldn't see a "wave", because we're talking about light).

When both waves hit the wall, if they are "in phase", they add together (called constructive interference), and you see an even brighter spot on the wall.

If the waves are "out of phase", then they subtract from each other (called "destructive interference") and you'd see a dark spot. In advanced labs, like in college, you'll learn how to create a phase shift between two waves by adding extra travel length to one of the waves along its path.

So why are there dark lines along the light line when you shine your laser on the hair in this experiment? It has to do with something called "interference".

One kind of interference happens when light goes through a small and narrow opening, called a slit. When light travels through a single slit, it can interfere with itself. This is called diffraction.

When light travels through one of two slits, it can interfere with light traveling through the other slit, a lot like how water ripples can interfere with each other as they travel over the surface of water.

If you're wondering where the slit is in this experiment, you're right! There's no narrow opening that light it traveling through. in fact, light appears to be traveling around something, doesn't it? Light from the laser must travel around the hair to get to the wall. THe way that light does this has to do with Babinet's Principle, which relates the opposite of a slit (a small object the size of a slit) to the slit itself.

It turns out amazingly enough that when light hits a small solid object, like a piece of hair, it creates the same interference pattern as if the hair were replaced with a hole of the same size. This idea is called Babinet's Principle.

By measuring the diffraction pattern on the wall, we can measure the width of a small object that the light had to travel around by measuring the dark lanes in the spot on the wall. In our lab, the small object is a piece of your hair!

## Questions to Ask:

1. What would happen to the diffraction pattern if the hair width was smaller?
2. Using this experiment, how can you tell if the hair is round or oval?
3. If we redid these experiments with a different color laser instead of red, what changes would you have needed to make?

# Solar Battery

## Activity

This is the kind of energy most people think of when you mention 'alternative energy', and for good reason! Without the sun, none of anything you see around you could be here. Plants have known forever how to take the energy and turn it into usable stuff… so why can't we?

**Materials**

- 1 sq. foot of copper flashing sheet (check the scrap bin at a hardware store)
- alligator clip leads (Radio Shark Part #278-1156)
- multimeter (Radio Shack #22-810)
- electric stove (*not* gas
- large plastic soda bottle or water bottle
- ¼ cup salt
- 2 binder clips or clothespins
- sandpaper
- sheet metal shears

**Always wear your safety goggles and gloves.**

## Experiment

**To start with, watch the video** for this experiment:

[SuperchargedScience.com/savs6.htm](SuperchargedScience.com/savs6.htm)

**Access code: ESCI**

1. Cut the copper flashing to fit on top of the stovetop using the metal shears. You will need two pieces the same size, but only one of them gets prepared on the stove.

2. Wash the copper flashing carefully (watch for sharp edges) with soap and water.

3. Scrub both sides of the copper flashing with sandpaper. (You're removing the oxide layer on the copper.)

4. Place it right on top of an electric stove burner at the highest setting for a half hour. Turn on your vent hood if you're doing this inside the house.

5. Turn off the burner and allow it to sit on the burner for 20 minutes.

6. You should have a black layer on top of the copper.

7. While the copper flashing is cooling, remove the neck from a water bottle.

8. Curl the cooked flashing so it will fit inside your bottle. The side that was facing up while it was on the burner should be facing out.

9. Cut a second piece of flashing the same size (if you haven't already) and curl it so it fits inside your water bottle on the other side. You don't want these pieces to touch, so secure in place with binder clips.

10. Add water and salt to the container, filling it to nearly the top. Leave about an inch of the copper flashing out of solution. Stir it up.

11. Turn on your digital multimeter and connect the positive to the fresh piece of copper, and the negative to the cooked copper. Set your multimeter to read amps and place your cell in the sun.

12. Take a reading in the sun and shade!

## What's Going On?

While normally it takes factories the size of a city block to make a silicon solar cell, we'll be making a copper solar cell after a quick trip to the hardware store. We're going to modify the copper into a form that will allow it to react with sunlight the same way silicon does.

The image shown here is the type of copper we're going to make on the stovetop.

This solar cell is a real battery, and you'll find that even in a dark room, you'll be able to measure a tiny amount of current. However, even in bright sunlight, you'd need 80 million of these to light a regular incandescent bulb.

**How does that work?**

In the 1800s, scientists discovered the *photoelectric effect*. This was an unusual effect that caused electrons to be ejected from a metal plate when a blue light was shone on the surface. Since this behavior didn't match the way light waves should act, it really puzzled the scientists.

Later in 1905, Einstein explained the photoelectric effect by suggesting that light comes in packets, like M&Ms are little packets of chocolate. These little packets of light are called photons.

This cuprous oxide solar cell ejects electrons when placed in UV light, and sunlight has enough UV light to make this solar cell work. Those free electrons are now free to flow, which is exactly what we're measuring with the digital multimeter.

Semiconductors are the secret to making solar cells. A semiconductor is a material that is part conductor, part insulator, meaning that electricity can flow freely and not, depending on how you structure it. There are lots of different kinds of semiconductors, including copper and silicon.

In semiconductors, there's a gap (called the bandgap) that's like a giant chasm between the free electrons (electrons knocked out of its shell) and bound electrons (electrons attached to an atom). Electrons can be either free or attached, but it costs a certain amount of energy to go either way (like a toll both).

When sunlight hits the semiconductor material in the solar cell, some of the electrons get enough energy to jump the gap and get knocked out of their shell to become free electrons. The free electrons zip through the material and create a low of electrons. When the sun goes down, there's no source of energy for electrons to get knocked out of orbit, so they stay put until sunrise.

When the sun moves across the sky, solar cells on a house receive different amounts of sunlight.

## Questions to Ask

1. Is there a difference in the reading you get on the multimeter when placed in direct sunlight or shade?

2. What if you fill your container with only water (and leave out the salt)?

3. Does it really matter what angle the solar cell makes with the incoming sunlight? If so, does it matter much?

4. Does the temperature of the salt solution matter?

5. How can you connect two of these up together?

# Teaching Science Right

Hopefully these activities have given you a small taste of how science can be totally cool AND educational.

## But teaching homeschool science isn't always easy.

You see, there's a lot more to it than most traditional science books and programs accomplish. If your kid doesn't remember the science they learned last year, you have a problem.

## What do kids really need to know when it comes to science?

Kids who have a solid science and technology background are better equipped to go to college, and will have many more choices once they get out into the real world.

**Learning science isn't just a matter of memorizing facts and theories.** On the contrary, it's developing a deep curiosity about the world around us, AND having a set of tools that lets kids explore that curiosity to answer their questions.

Teaching science in this kind of way isn't just a matter of putting together a textbook with a few science experiments and kits.

**Science education is a three-step process** (and I mean teaching science in a way that your kids will really understand and remember). Here are the steps:

1. Get kids genuinely interested and excited about a topic.
2. Give them hands-on activities and experiments to make the topic meaningful.
3. Teach the supporting academics and theory.

**Most science books** and programs just focus on the third step and may throw in some experiments as an afterthought. This just isn't how kids learn.

**There is a better way.** When you provide your kids with these three keys (in order), you can give your kids the kind of science education that not only excites them, but that they remember for many years to come.

**Don't let this happen to you…** you buy science books that were never really used and now your kids are filling out college applications and realizing they're missing a piece of their education—a REALLY big piece. Now *that's* a setback.

## So what do you do?

First, don't worry. It's not something that takes years and years to do. It just takes commitment.

**What if you don't have time?** What I'm about to describe can take a bit of time as a parent, but it doesn't have to. There is a way to shortcut the process and get the same results! But I'll tell you more about that later.

# Putting It Into Action

**Step one**: Get kids genuinely interested and excited about a topic.

Start by deciding what topic you want your kids to learn. Then, you're going to get them really interested in it.

For example, suppose I want my 10-year old son to learn about aerodynamics. I'll arrange for him to go up in a small plane with a friend who is a pilot. This is the kind of experience that will really excite him.

**Step two:** Give them hands-on activities and experiments to make the topic meaningful.

This is where I take that excitement and let him explore it. I have him ask my friend for other chances to go flying. I'll also have my friend show him how he plans for a flight. My son will learn about navigation, figuring out how much fuel is needed for the flight, how the weight the plane carries affects the aerodynamics of it, and so much more.

I'll use pilot training videos to help us figure this out (short of a live demo, video is incredibly powerful for learning).

**My son is incredibly excited** at this point about anything that has to do with airplanes and flying. He's sure he wants to be a pilot someday and is already wanting flying lessons (he's only 10 now).

**Step three:** Teach the supporting academics and theory.

Now it's time to introduce academics. Honestly, I have my pick of so many topics, because flying includes so many different fields. I mean he's using angles and math in flight planning, mechanics and energy in how the engine works, electricity in all the equipment on board the plane, and of course, aerodynamics in keeping the plane in the air (to name just a few).

**I'm going to use this as the foundation** to teach the academic side of all the topics that are appropriate.

We start with aerodynamics. He learns about lift and drag, makes his own balsa-wood gliders and experiments by changing different parts. He calculates how big the wings need to be to carry more weight and then tries his model with bigger wings. (By the way, I got a video on model planes so I could understand this well enough to work with him on it).

Then we move on to the geometry used in navigation. Instead of drawing angles on a blank sheet of paper, our workspace is made of airplane maps.

We're actually planning part of the next flight my son and my pilot buddy will take. Suddenly angles are a lot more interesting. In fact, it turns out that we need a bit of trigonometry to figure out some things.

**Of course, a 10-year old can't do trigonometry**, right? Wrong! He has no idea that it's usually for high school and learns about cosines and tangents.

Throughout this, I'm giving him chances to get together with my pilot friend, share what he's learned, and even use it on real flights. How cool is that to a kid?!

**You get the idea.** The key is to focus on building interest and excitement first, then the academics are easy to get a kid to learn.

Try starting with the academics and...well, we've all had the experience of trying to get kids do something they don't really want to do.

## The Shortcut

Okay, so this might sound like it's time-intensive. If you're thinking "I just don't have the time to do this!" or maybe "I just don't understand science well enough myself to teach it to my kid." If this is you, you're not alone.

The good news is, you don't have to. The shortcut is to find someone who already specializes in the area you want your kids to learn about and expose them to the excitement that persons gets from the field.

Then, instead of you being the one to take them through the hands-on part and the academics, use a solid video-based homeschool science

program or curriculum (live videos, not cartoons).

This will provide them with both the hands-on experiments and the academic background they need. If you use a program that is self-guided (that is, it guides your kinds through it step-by-step), you don't need to be involved unless you want to be.

I'm partial to the "e-Science" program from SuperchargedScience.com (after all, I'm in it), but honestly, as long as a program uses these components and matches your educational goals, it should be fine.

**Your next Step** should be to take a look at how you're teaching science now and simply ask "Is my kid getting the results I want from his or her science education?"

**After this**, consider how you can implement the three key steps we just talked about. Either go through the steps yourself, or use a program that does this for you.

**If you want to learn more** about how to teach science this way, we regularly give free online tele-seminars for parents. To learn more about them, visit:

SuperchargedScience.com/freeteleclass.htm

My hope is that you have some new tools in your homeschool parent toolbox to give your kids the best start you can in life.

Again, I want to thank you for taking the kind of interest in your child that it takes to homeschool. I know it's like a wild roller coaster ride some days, but I also know it's worth it. Have no doubt that the caring and attention you give to your child's education today will pay off many fold in the future.

My best wishes to you and your family.

Warmly,

*Aurora*